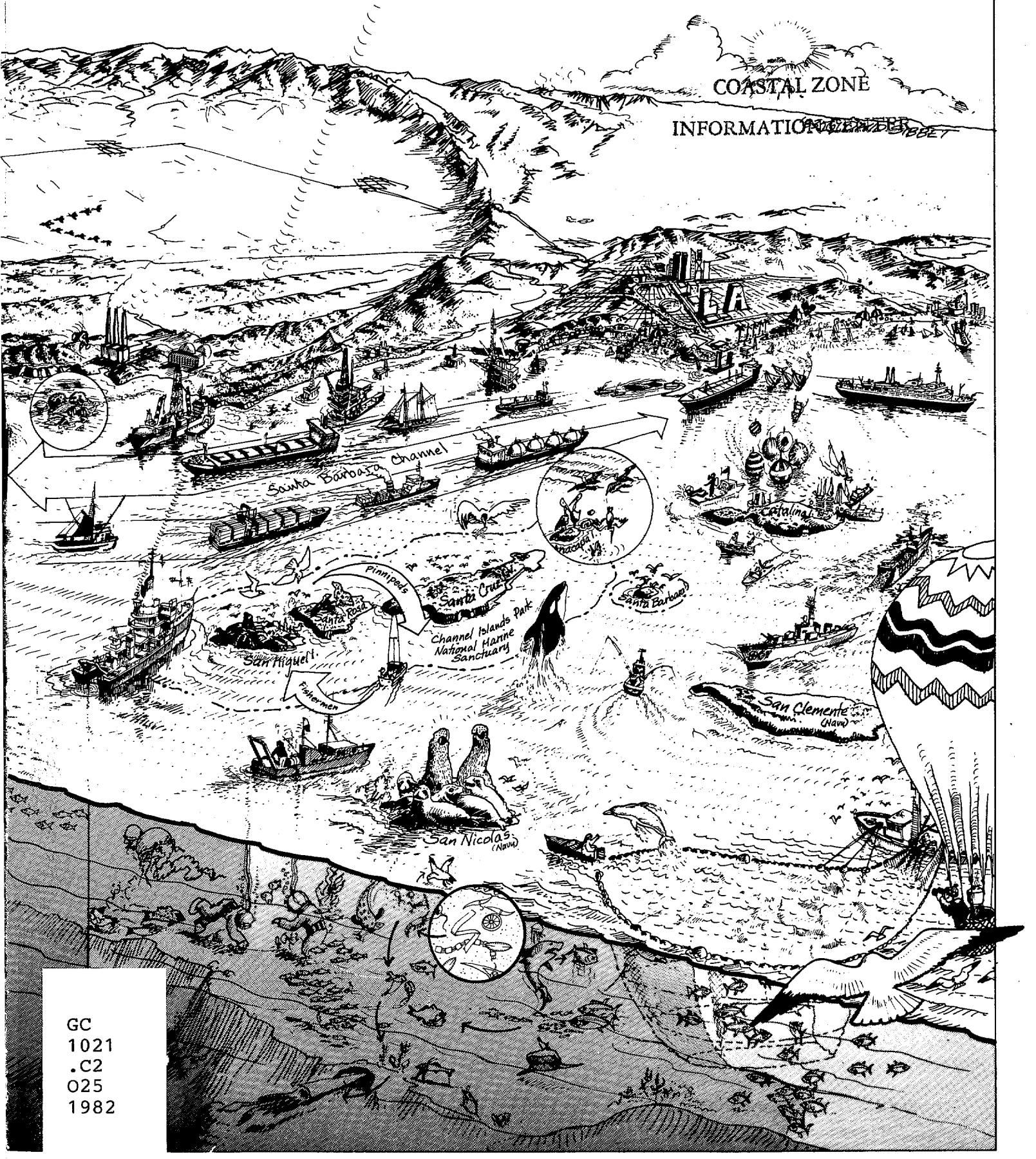
OCEAN STUDIES SYMPOSIUM



Proceedings of the

OCEAN STUDIES SYMPOSIUM

November, 1982

Edited by
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Foreword by
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and

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the William H. Donner Foundation, the U.S. Fish and Wildlife Service,
and Chevron, USA

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230
(202) 377-3111

In accordance with the provisions of Section 102(2)(C) of the National Environmental Policy Act of 1969, we are enclosing for your review and consideration the draft environmental impact statement prepared by the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, Department of Commerce, on the proposed Maine Coastal Zone Management Program.

Any written comments you may have should be submitted in duplicate to the person listed below by June 12, 1978.

If you have any questions about the enclosed statement, please feel free to contact:

Kathryn Cousins
Office of Coastal Zone Management
3300 Whitehaven Street, N.W.
Washington, D. C. 20235
Telephone: 202/634-4235

Thank you for your cooperation in this matter.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure

Foreword

California's marine resources are extensive, diverse and extremely valuable, contributing substantially to the economic and social well-being of people throughout the state, the nation and the world. These assets encompass diverse plants and animals, minerals, petroleum and other extractable, nonliving resources. Uses of California's marine waters include fisheries, transportation, waste disposal, recreation and the numerous aesthetic qualities we attribute to the ocean and its coastline.

During early settlement of the west coast of North America, demands on the ocean and marine resources of California were limited primarily to coastal vessel traffic and the harvesting of a rich variety of seafood and marine mammal products. At that time, administrative and regulatory needs were few and therefore relatively simple. Today, transportation and fishing continue to be two of the most economically important activities in the marine environment; in addition, there have been major new demands on our limited ocean resources. This has resulted in a complex system of local, state and federal government agencies to administer and regulate the use and users of the marine resources.

In California, which has been a national leader in coastal management, the state government agencies share assigned responsibility for protecting fish and wildlife, maintaining water and air quality, developing mineral resources and controlling coastal land uses.

Each agency — and every group that is interested in marine resources — has its own view on how to best handle the issues with which it is most concerned. Yet the future of the sea demands that we learn more about the ocean environment, share our information and seek solutions that can advance our individual interests in such a manner to best protect the ocean's resources. There must be statewide recognition of, and consensus on, the need to protect the existing and potential productivity and value of all ocean resources while achieving optimal potential values from our extractable, nonliving resources.

With a grant from the William H. Donner Foundation, the California Coastal Commission and the California Department of Fish and Game sponsored the Ocean Studies Symposium in November 1982. The Symposium brought together representatives from agencies and organizations concerned with ocean and coastal issues to share information and discuss the problems of managing California's marine resources. Participants included lawmakers, industrialists, academicians, administrators, environmentalists, scientists, fishermen and many citizens who share a concern for the ocean and its vast resources.

We believe that the Symposium was successful. It resulted in dozens of scientific and policy-oriented papers and brought together for the first time in more than a decade decision-makers and constituents from all relevant sectors. Because of time constraints, the papers presented and discussions held could not cover all the issues and points of view associated with California's marine resources. This report is not a consensus on, nor comprehensive presentation of, all marine resource issues and answers. It does, however, point out the increasing complexity of uses and issues which need to be dealt with by government in cooperation with the public.

The Ocean Studies Symposium report is primarily intended to record the Symposium itself and to serve as an initial source of material for use during the next phase of an ongoing process. Assembly Concurrent Resolution (ACR 15), now being considered by the State Legislature, directs the Joint Legislative Committee on Fisheries and Aquaculture to analyze the Symposium report and develop a plan for guaranteeing the wise use and management of California's marine resources. The Coastal Commission and Department of Fish and Game, along with other state and federal agencies, have worked diligently to establish a harmonious relationship among ocean users. But without overall guidance on all aspects of ocean use and management, individual agency decisions may result in issues being addressed in a fragmented fashion.

The Coastal Commission and Department of Fish and Game now look forward with interest to the result of the Joint Committee's efforts. We pledge assistance towards the completion of that task, and we hope this report will prove a valuable contribution.

Michael L. Fischer
California Coastal Commission

E. C. Fullerton
Department of Fish and Game

Acknowledgments

Virginia Lyle, director of the Ocean Studies Project, coordinated the contributions of the large number of individuals and organizations involved in the different phases of the project, organized the Ocean Studies Symposium, and edited this report.

Special acknowledgement is made to the following individuals:

Michael L. Fischer developed the study concept, obtained financial support and provided continual guidance.

Susan Hansch, the Coastal Commission's marine resources specialist, was instrumental to the entire project. Her advice, analytical skills and knowledge of the State's marine resources issues and conflicts were a major contribution to the design of the project, the Symposium and this report.

The efforts, concern and diligence of Dr. Frank H. Talbot, chairman of the Moderator's Group, and the panel moderators, made the conference a success. The eleven panel moderators who deserve special thanks for their very difficult task are: John Temple Swing, Dr. Fred S. Conte, Dr. Elizabeth Venrick, Dr. Charles Woodhouse, John Epting, Conrad G. Welling, Dr. Welton Lee, Dr. Don Walsh, Thomas Tobin, Dr. Robert Freidheim and Michael B. Wilmar.

The major contribution was made by the 75 men and women who prepared a technical or management policy paper for the Symposium. Those policy papers were the basis of all Symposium discussion and this report.

David Sibbet was particularly valuable in providing advice during the design of the conference, facilitating the Symposium panel discussions, making "wall-sized graphic notes," and designing the cover of this report.

William J. Whalen was a most able chairman of the Symposium; as Executive Director of the San Francisco Planning and Urban Research Association, he and his organization provided invaluable assistance in administering the grant funds for the project.

Dr. James W. Rote, consultant in the Assembly Office of Research, assisted .the direction of the study with his technical advice and knowledge of national and state marine resource issues.

The Symposium photographs were taken by Kati Corsaut, the Coastal Commission's public affairs director.

Special thanks to the many others at the Coastal Commission and the Department of Fish and Game who contributed to this project.

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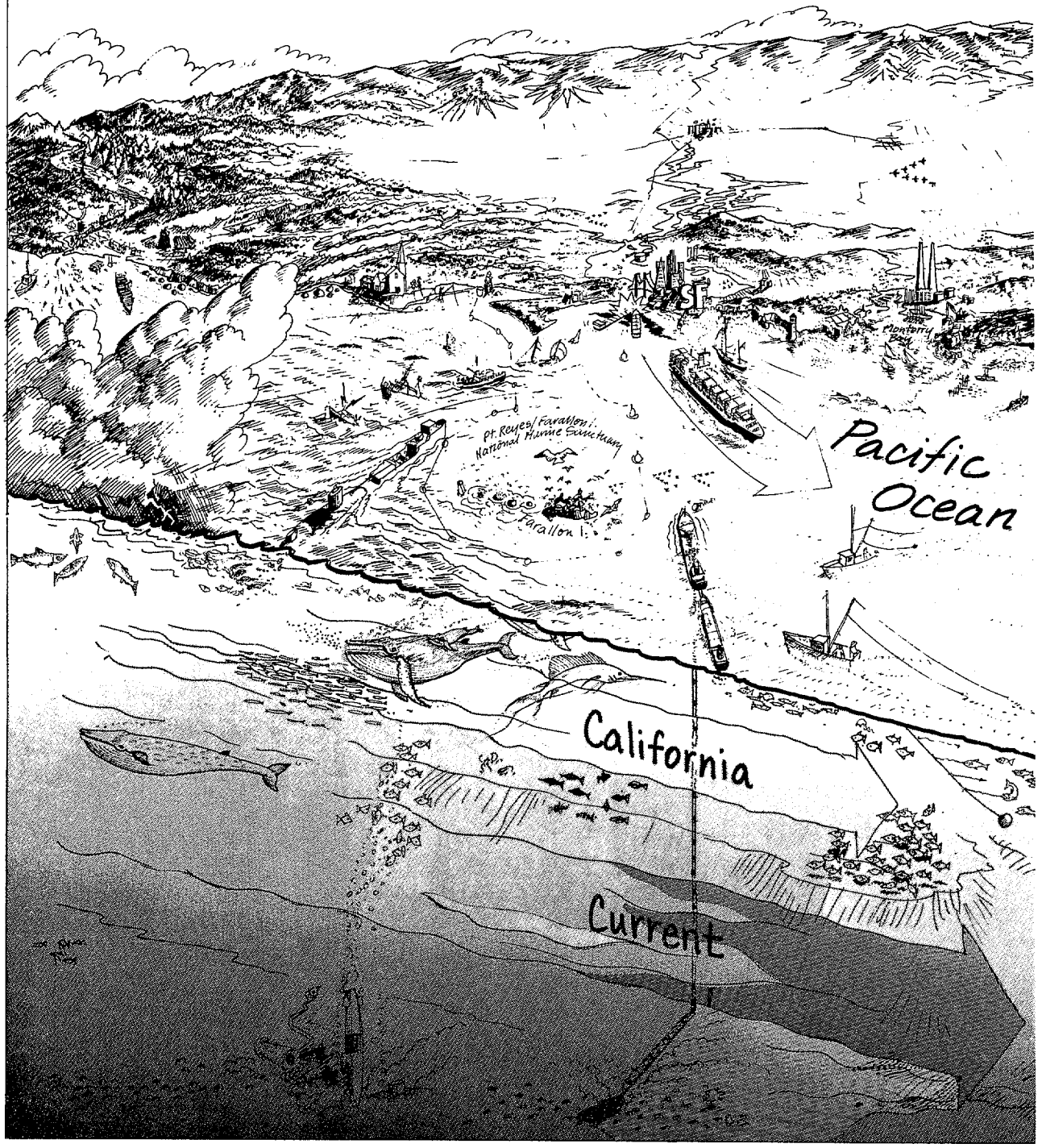
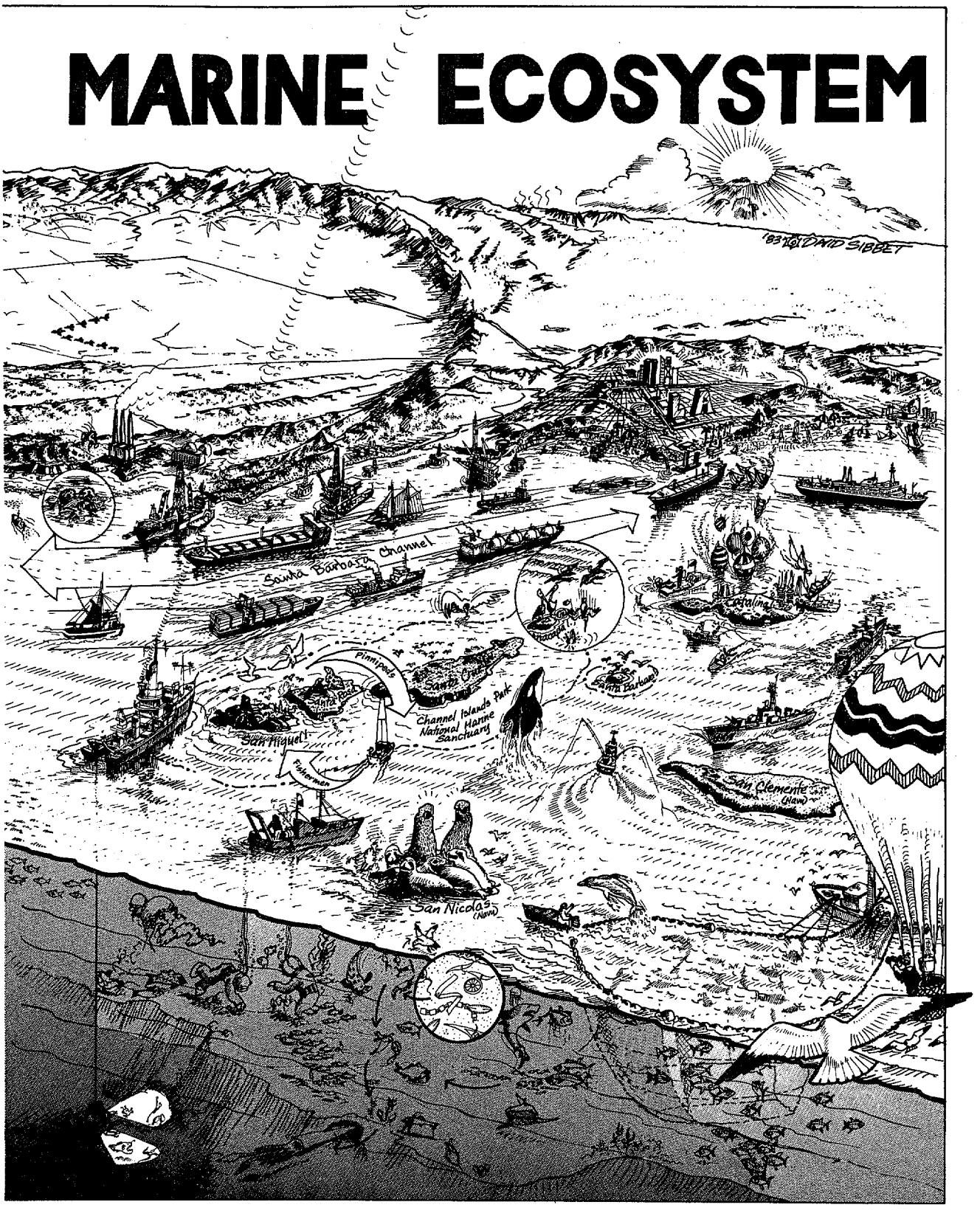


MARINE ECOSYSTEM



Introduction

These proceedings of the Ocean Studies Symposium are not meant to be all inclusive nor a definitive analysis of California's marine resources and the State's future management role. Rather this report is meant to present an overview of the Symposium and to touch on the many marine resource management issues and concerns facing California and the nation's decision-makers. As man's use of the nearshore ocean and its many resources increase, conflicts over the use and management of these resources also increase. If careful planning and management methods are not provided, there may be irreversible damage to some resource.

While state and federal government agencies work to provide the best management possible, they often have piecemeal jurisdictions and fragmented responsibility for enforcement and regulation of marine resource use. Also, each agency must respond to the policies and objectives established for it and to the needs of its own constituency group. If coordination of knowledge and efforts is not made and each group is concerned only with its own particular interest, there easily could become a "I win, you lose" situation over use and management of many ocean resources.

In the simplest terms, the purpose of the Ocean Study Project and Symposium was to begin an "I win, you win" process. Representatives of all the marine resources management agencies and constituency groups, the "vested interests", were invited to the Symposium and offered the opportunity to talk with each other in an informal manner, not as adversaries but as co-participants with equal standing in a learning situation. The 250-plus Symposium participants were industry representatives, state, local and federal government agency managers, researchers and academicians from California's universities and colleges, national and state marine researchers, environmentalists and members of the Legislature. During the three days of the Symposium, each participant was exposed to something outside his/her own particular technical expertise and area of concern.

The intent of the Symposium was not to present an exhaustive study of the resources, issues and conflicts that face California's managers and users of the nearshore ocean resources. There was no attempt to provide in-depth analysis of technical data, to influence political decision-making processes or to respond to those emotional concerns common to all constituency groups. The sole purpose of the Symposium was to start communication among the diverse groups to allow for information exchange on a variety of subjects not normally considered by those working in specialty fields and to provide fresh insight in the earliest stage of a State planning process.

The Symposium was crowded with long, intense sessions and an abundance of information. The participants were there to learn, discuss and argue over uses, conflicts and potential solutions to California's marine resource management issues. These participants were the first players in an ongoing process to determine the most effective use, allocation and management of the State's invaluable ocean resources.

This Symposium was a first step for the State of California. For its citizens, lawmakers, regulatory agency managers and industries to look at the ocean as a "commons" with many, often conflicting uses and to realize that its resources are finite even though the ocean has long been considered vast and limitless. If careful thought and planning doesn't start now, the opportunity may be lost. Future genera-

tions will not have as many options for management, nor so many resources available, if concerns are not dealt with and judgement is not used today.

The first section of this report outlines the uses and benefits Californians receive from the ocean. This section is not definitive, but it attempts to paint a broad picture of the resources, their uses and economic benefits to the State.

The second section describes the resource issues, conflicts, areas needing resolution and suggestions for potential solutions discussed at the Ocean Studies Symposium. An attempt is made to provide an overview of the Symposium, the panel presentations and the discussions, whether during formal question and answer periods or around a coffee pot. Not every presentation or discussion topic from the Symposium is included, nor is every area of concern in ocean resource management identified, but a sense of the variety and complexity of issues should emerge.

Both the first and second sections draw on the policy papers and technical presentations made during the Symposium. The material presented here is gleaned from those sources; however, specific credit for ideas, statistics or quotations is not given.

The third section contains the suggestions and recommendations for future action made by the core group, the focus of the Symposium's efforts. The thirty-member core group did not call for formal action by the Legislature or a state agency but made general recommendations and suggestions for needed policy determination.

The core group and the other participants at the Ocean Studies Symposium were the first step of an ongoing process to determine the future role of the State of California in marine resources management. A process with many players that will continue over the next years to work and decide together on each component of an eventual plan to best manage the State's ocean resources.

Section I

USES AND IMPORTANCE OF CALIFORNIA'S OCEAN RESOURCES

The Pacific Ocean bordering California's 1,100-mile coast provides a wealth of natural resources and beneficial uses to the citizens of the State and to the entire nation. The ocean's cornucopia contains both living and nonliving, renewable and non-renewable, extractable resources. Commercial and sport fishermen take numerous marine species from nearshore and offshore waters for profit and pleasure. The saltwater of the sea and brackish-waters of bays and estuaries offer a medium for cultivating many of these species through mariculture activities. Marine mammals and seabirds, while not presently exploited commercially, abound in and around Pacific waters, providing enjoyment for nature lovers and filling important niches in the marine ecosystem.

Nonliving resources extracted from the sea include energy supplies, minerals, and a potential source of freshwater. As land based oil, natural gas, mineral, and water supplies diminish, these resources of the sea become all the more important to the nation's economy and general well-being.

At the same time, this vast water body serves as a repository for every conceivable form of modern man's waste. Some waste material enters the ocean by way of atmospheric fallout and river runoff while other forms of pollution, such as oil spills from tanker groundings and collisions, are accidental. The bulk of material discarded into the ocean, however, is done so intentionally. Opinions on the capacity of the ocean to assimilate wastes currently differ; under existing regulations the ocean continues to be used for the accommodation of domestic, industrial, thermal and radioactive wastes, and other toxic materials. As land fill sites become more scarce, the ocean will also become more attractive as a dumping ground for sewage sludge and solid waste.

Just as the railroads and freeways of the land provide vital transportation links, the Pacific Ocean serves as a major highway for commerce. California ports handle billions of dollars of imports and exports annually. Shipping lanes close to shore provide safe transit for thousands of vessels, critical to the maritime industry of the State, the nation, and the world.

While the ocean provides many material benefits, perhaps the recreational uses of the sea will be of greater importance in the future. The Pacific serves as a playground for millions of California residents and visitors, who enjoy, among other things, sailing, surfing, swimming, sunbathing, skin and scuba diving, sport fishing and water skiing. Some people simply choose to stand on the beach and watch the beauty and power of the sea.

Another important aspect of the ocean is its influence on climate and weather. The State's renowned moderate climate is partially due to the California Current, which acts as a giant air conditioner on the offshore winds. The ocean is not always so generous, and it can be the source of damaging storm waves, shoreline erosion, lack of rainfall in southern California, summer fogs in central and northern California, temperature inversions which lead to smog conditions, and saltwater intrusion in onshore freshwater aquifers.

A long-term program of oceanographic research could provide economic benefits in savings in the costs of goods and services and increases in production. Although most marine science research is funded at the federal level, California, with its network of outstanding academic institutions and an infrastructure of industrial technology, is at the forefront in delving into the untold mysteries of the sea. In the mid-1960's it was estimated by the National Academy of Sciences Committee on

Oceanography that the value of benefits, over a twenty-year period, directly attributable to oceanographic research would be four to five times the expenditures.

Finally, the economic value of the multiple uses of the sea, if calculated, would reach trillions of dollars. The value of many of the amenities, as well as the use of the ocean for military operations, is unquantifiable. The following section attempts to document the value and importance of California's major marine resources and various uses of the ocean. This material is extracted from the policy papers, panelist presentations and discussions during the November 1982 Ocean Studies Symposium.

LIVING MARINE RESOURCES

Commercial Fishing

Landing records provide basic information on the amount and values of marine resources taken by California's commercial fishermen. Department of Fish and Game records show that fishermen landed 780 million pounds of fish and shellfish from California waters, worth $280 million (dockside or ex-vessel value) in 1981.

The commercial fishing industry is important to the State of California in many ways, for its economic impact, as a source of food, and as a source of employment in coastal communities. In many coastal communities, commercial fishing is a mainstay of the economy, with boat construction and repair yards, gear and rigging stores, and fish processors all depending on a healthy fishing industry. The eventual value of fish and shellfish landings to the State's economy increases three to four times when economic multipliers are considered.

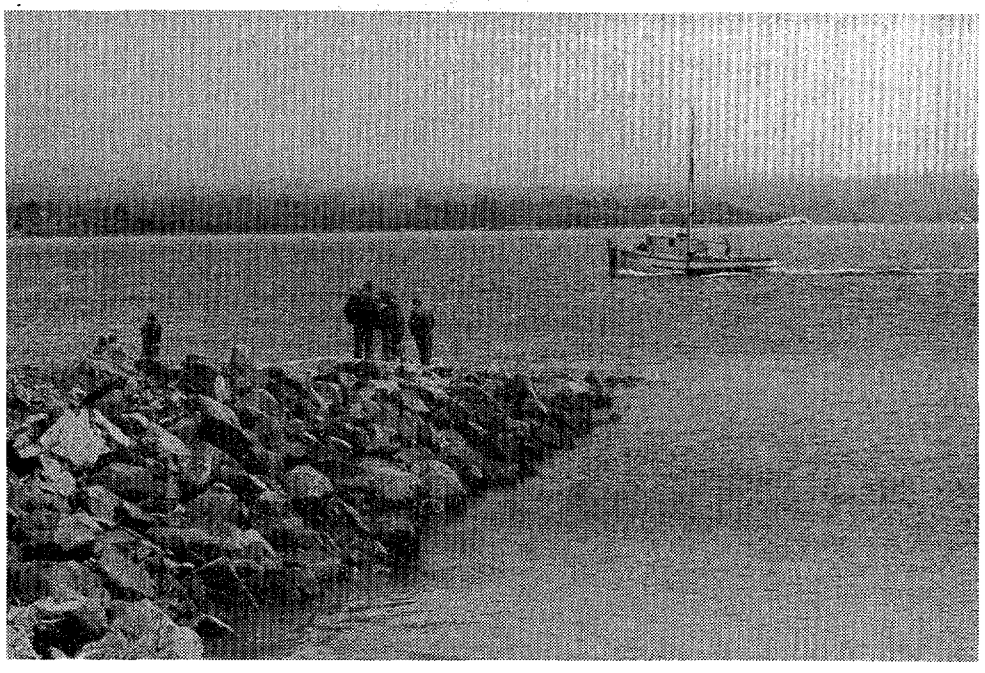
Salmon is one of the State's most valuable commercial fishery resources and is dependent on conditions in both the marine environment and inland waters. Public fish hatcheries and related programs have been crucial in supporting this fishery. Preliminary estimates indicate between 30 and 40 percent of California's commercial salmon landings in recent decades are hatchery produced. Salmon landings in California have averaged 6.6 million pounds per year since 1956, with an all-time high of 11.3 million pounds landed in 1956 and a low of 4.1 million pounds in 1958. According to the National Marine Fisheries Service, salmon was the second most important fishery resource in the United States in 1981. Salmon landings for 1982 were predicted at approximately 8.0 million pounds. The average ex-vessel value of the California commercial salmon fishery is about $12 million. This value was approximately $20 million in 1982, which was a very good year.

Recreational Fishing

Marine anglers enjoy a variety of sport fishing opportunities along the California coast. They regularly fish from open beaches, public piers, jetties, private boats and charter boats. Recreationists also enjoy ocean diving for fish, mollusks and crustaceans, and many clam on open beaches and in protected bays.

These activities have not only a tremendous positive impact on California's economy, but also represent an extremely important contribution to recreational opportunities available to California residents and out-of-state visitors. For instance, Department of Fish and Game records indicate that, during 1980, 761,000 anglers fishing from 303 commercial passenger fishing vessels captured a reported 6,407,949 fish from marine waters. Department records further indicate that anglers fishing from private boats in southern California alone spent 2,178,210 hours on fishing trips catching an estimated 962,479 fish in 1981.

While current estimates of the overall economic contribution of recreational fishing are unavailable, values for 1970 can be found in "A Socio-Economic Analysis of California's Sport and Commercial Industries", Gruen and Gruen. They estimate that the primary net economic value of marine sport fishing in California during 1970 was $24-$47 million and estimated that the secondary economic value based on gross expenditures of sport fishermen in California during 1970 was approximately $110 million. It is unknown what current estimates might be using similar methodology; however, given the inflation rates of the past decade, figures could be expected to be substantially higher.



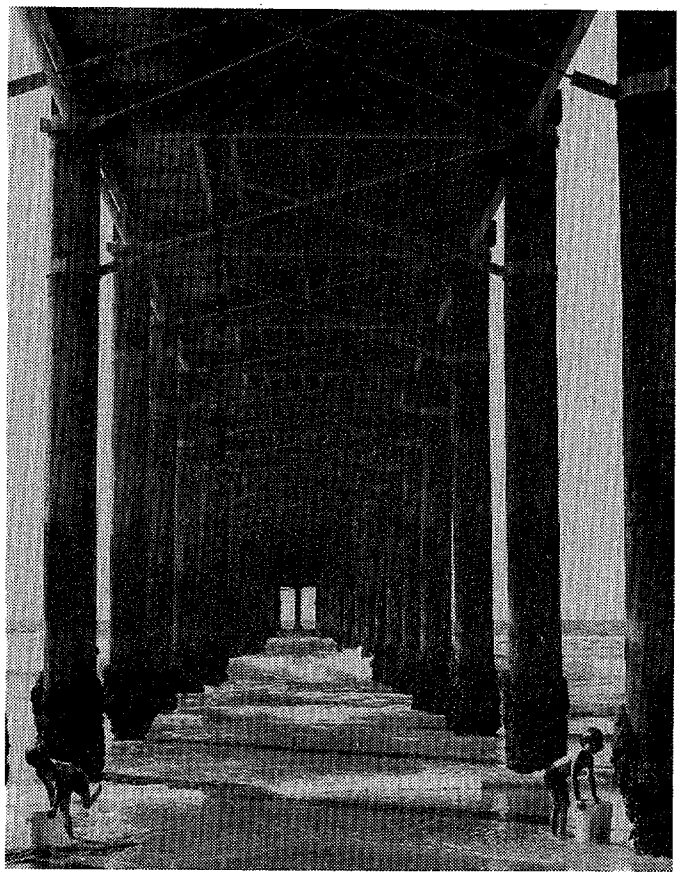
North Spit, Samoa, Humboldt County

Aquaculture

Aquaculture is generally defined as the culture or propagation of plants and animals in fresh, brackish or salt water. The term mariculture is used for aquaculture activities only in a saltwater medium.

California aquaculture exists today as a viable contributor to the State's economy and the State is a national leader in aquatic food production. Already over 30 different kinds of plants and animals are being cultured or are in advanced stages of research and development. In addition to such species as trout, catfish, bait fish, tubifex worms, ornamental fish, crayfish, carp and oysters, where cultural techniques are reasonably well developed, species seriously being investigated are abalone, salmon, sunfish, scallops, clams, mussels, lobsters, bull frogs, turtles, striped bass, sturgeon, algae, kelp and other aquatic plants. The diversity of species with the capacity for culture within the State gives California the potential of becoming the nation's leader in aquatic production.

Many of the techniques of marine aquaculture have already been developed, as exemplified by the public salmon hatchery system and the 125-year-old oyster industry, whose production in California waters is supported entirely by planted seed. The contribution of hatchery-produced salmon to the total ocean production is not currently known. Existing data indicates the contribution may be in the neighborhood of 40 percent.



Scripps Pier, San Diego County

The private aquaculture industry in California produced approximately six million pounds of products in 1982. The bulk of this production was in freshwater species, with two and one-quarter million pounds of trout, and one and one-quarter million pounds of catfish. Bait fish, ornamental fish, sunfish, frogs and crayfish account for the remainder of the freshwater production. Approximately one million pounds of the six million pound total was shellfish. The potential for significant economic growth in the emerging mariculture industry is based on the culture of abalone, mussels, clams, scallops, marine algae and finfish.

To illustrate this economic potential, in the United States, abalone are found only along the Pacific coast. They were originally fished commercially only in California, although fisheries and aquaculture development efforts have recently begun in Oregon, Washington and Alaska, as well as Canada. Historically, the California fishery has focused on the red abalone Haliotis rufescens, the largest of the world's eighty species. As stocks of this species have become depleted, fisheries and aquaculture interests have transferred, in part, to other species, particularly those adapted to the warmer waters in the southern part of the State. Worldwide demand for abalone has risen steadily in recent years, driving retail prices to their present high levels of $20-$30 per pound. Annual production of abalone from commercial fisheries in California is presently about one million pounds per year, making this a very lucrative business. Industry spokesmen estimate Japanese markets for small-sized abalone produced by mariculture will bring close to $50 per pound.

Marine phytoplankton are the primary forage of the oceans and are the base for many marine food chains. Seaweeds, which are more complex forms of marine algae, are also consumed by humans or used by industry in the manufacture of hundreds of products. Most seaweeds used in the United States are not consumed directly as food but as extracts used in the manufacture of biomedical products, household commodities and foods. Seaweed extracts (phycocolloids) have found their way into nearly all types of everyday products including toothpaste, cosmetics, shampoo, baby foods, milk products, beer-making and pet foods. Presently, there is an especially high demand for quality agar as a microbiological media. Dried, baled agar-producing seaweeds used for extracting biomedical grade agar sell for about $1,600 per ton.

Except for kelp, the United States imports nearly all the seaweeds used for food or extracts. The Kelco Division of Merck and Company, Inc., one of the State's largest kelp harvesting companies, manufactures approximately seventy different algin products from the giant kelp Macrocystis harvested in California's nearshore waters. The properties of these products are important to a number of industries as highly efficient thickening, stabilizing, suspending and gelling agents. As an example of the economic benefits to the State from kelp harvesting, Kelco's harvesting, manufacturing and research operations require a substantial work force, currently about 1,600 people representing an annual payroll of 20 million dollars. The annual sales of algin products manufactured in California exceed 35 million dollars.

Conservative estimates of wholesale figures place California aquaculture producer income at 10.6 million dollars in 1980 and above 11 million dollars in 1982. Once the products are in the retail market, as food items or as fish and bait for the recreational industry, these figures increase three to five times.

The State's largest aquaculture producer is the California Department of Fish and Game. The Department in 1982 produced approximately 50 million fish, totaling five million pounds. These are mostly trout, catfish and salmon. Present plans for Department hatchery operations include expansion of striped bass production.

Marine Mammals and Seabirds

The direct uses and importance of marine mammals and seabirds at this time are for aesthetic, scientific and display purposes. In addition, marine mammals are fast becoming an important factor in the dynamics of the marine ecosystem. Harvested to near extinction in some cases, the recovery of some species, especially the pinnipeds, since protective laws were enacted has been remarkable. Since the 1972 Marine Mammal Protection Act, it has been illegal to injure, harass or kill sea mammals.

Sighting records of seabirds in California waters include the following species groups alcids, loons, grebes, scoters, pelicans, shearwaters, shorebirds, kittiwakes, fulmars, gulls, terns and cormorants with their numbers estimated in the millions.

Many of the cetaceans, such as the California gray whale, migrate through California waters annually. The gray whales' proximity to land as it transits south each winter provides an excellent spectacle for sightseers. Other whales that can be seen in California include the blue, fin, sei, Bryde's minke, humpback, sperm, killer and pilot whales. Several species of dolphins and porpoises are also found.

Six species of pinnipeds inhabit California waters: the northern elephant seal, harbor seal, California sea lion, Steller sea lion, northern fur seal and Guadalupe fur seal. The sea otter, a member of the weasel family and closely related to river otters, is now found in central California waters. This animal, popular with nature lovers, has made a dramatic comeback from near extinction in the 1930's. Sea otters forage extensively on shellfish. Coupled with the increase and expansion of the sea otter population along the coast, this has resulted in a concurrent decline in shellfish in areas where otters forage. The decline in the shellfish stocks is such that they no longer support sport or commercial fisheries.

The most dramatic and best documented marine mammal population increase is that of the elephant seals. Observed breeding again on San Miguel Island in 1958 after a century's absence, these seals were increasing during the 1970's at a 12-15 percent rate annually. This rate can decline in years such as 1982 when winter storms caused very high pup mortality. Currently there are 20,000 elephant seals on San Miguel Island and they are spreading to the islands of San Clemente, San Nicolas, Santa Barbara, and the Coronados.

California sea lions, northern fur seals, harbor seals and Guadalupe fur seals are also experiencing increased populations. California sea lions now number 40,000-50,000 in the Channel Islands and, along with harbor seals, are beginning to impact on existing sport and commercial fisheries. Although still abundant in northern California waters, the Steller sea lion population is the only one declining in southern waters. While reasons offered for the decline include the collapse of the sardine population and a change in food supply due to warmer water, competition from increasing numbers of other pinniped species may be the most probable cause.

El Pescador State Beach, Los Angeles County

Energy

Energy sources from the sea include oil and gas deposits beneath the continental shelf, wave energy, thermal conversion, and fuel from kelp. The offshore area where the State owns mineral rights was delineated by the United States Supreme Court in 1966. This area can be generally described as an area between the coast, or the offshore islands, and a line three miles seaward. The total offshore area under California's jurisdiction is approximately 4,700 square miles. Seaward of the state waters, the Outer Continental Shelf (OCS) is under federal jurisdiction.

Since the 1969 Santa Barbara Channel blowout and oil spill there has been a moratorium on state oil leasing. However, the State Lands Commission recently approved a leasing program for an area in Santa Barbara County waters from Point Conception to Point Arguello. Estimates project a 95 percent likelihood of at least 63 million barrels of oil and 55 billion cubic feet of gas being recovered from the area. There is a five percent chance of at least 274 million barrels of oil and 219 billion cubic feet of gas. Financial returns to the State will be in the form of bonus bids and/or royalties paid on lease tracts by leasing petroleum companies. The State Lands Commission estimates that as much as 1.5 billion dollars of revenue could be generated over a 20-year leasing period.

The federal government manages the Pacific OCS oil and gas resources beyond the three-mile limit. The U.S. Interior Department's Mineral Management Service, Pacific Division, provides the following data in their annual summary report: total revenues from the lease sale of approximately 575 tracts on the Pacific OCS, 4 billion dollars; production of OCS oil in 1981, 58.8 million barrels (39.3 million from state leases, 19.5 million from federal leases); production of natural gas in 1981, 23.5 billion cubic feet (12.8 state, 10.7 federal).

The U.S. Geological Survey estimated that as much as 5.1 billion barrels of oil and 4.4 trillion cubic feet of gas could be recovered from the Santa Maria, Santa Cruz, Bodega, and Point Arena Basins off central and northern California. It was also estimated that the Eel River Basin and Outer Basins and Ridges could contain 4.4 billion barrels of oil and 7.1 trillion cubic feet of gas.

As fossil fuel supplies are being exhausted, new technologies are being developed to harness the power of ocean tides, currents, waves, and thermal differentials. "Dam-Atoll," a passive system which concentrates and converts ocean wave energy, is being developed to funnel incoming wave energy into a central core and convert it into electricity. Although only 1/10 scale pilot units have been tested, studies indicate that it could produce electrical energy at competitive rates in the future.

Another future source of energy is found in the fast growing giant brown kelp Macrocystis. A research effort is presently underway to test the feasibility of growing kelp in huge offshore farms. A by-product of the broken down cell structure of the kelp is methane gas, which can be burned directly in stoves, heaters, automobiles, electric generating plants, or even condensed into liquid fuels similar to gasoline.

Minerals

Some of the dissolved minerals in seawater are already the basis of important California industries. The San Francisco Bay area is one of the great solar-salt producing areas of the world, with an output of more than a million tons of salt a year, or about one-third of all the salt extracted by solar evaporation in the world. In addition to sodium chloride and some potassium compound produced by solar evaporation, seawater provides magnesium, chloride, bromine and chemicals used in the manufacture of gypsum. Depending on energy costs, it may be feasible to extract additional elements, such as strontium, boron, fluorine, aluminum and lithium.

Potentially valuable mineral deposits on the seafloor include phosphorite rock, manganese nodules and polymetallic sulfides. On the tops of the banks off the coast, some in water shallower than 50 fathoms, are large deposits of phosphate rock. These phosphorites are suitable for the manufacture of certain kinds of phosphate fertilizer essential to California's high agricultural productivity. Because shipping costs are a high percentage of the total cost of phosphate fertilizer, it may be possible to mine these offshore deposits and convert them to fertilizer more cheaply than phosphates produced elsewhere. Scientists have known for some time that phosphorites tend to become enriched in uranium and that, depending on the level of concentration, this valuable resource can be extracted. To date, however, marine phosphorite sources have not been commercially exploited because terrestrial resources are still relatively abundant and the technology for mining marine sources has not been developed.

Deeper in the ocean, covering vast stretches of the sea floor, lie incredibly large deposits of black, potato-shaped nodules. The metals contained in these nodules are strategically important to the United States. By weight they contain: manganese (25-30 percent), nickel (1.5 percent), copper (1.3 percent) and cobalt (0.25 percent). The most likely site for mining these so-called manganese nodules is in the Pacific Ocean west of Mexico and southeast of Hawaii in the Clarion-Clipperton fracture zone.

Private industry is seriously examining the prospect of harvesting manganese nodules. The value of the resource has been estimated to be as high as 3 trillion dollars, the largest resource ever discovered by man. However, because the nodules lie on the ocean floor 2,500 miles from the nearest land, no one can establish an exclusive right to them pursuant to current international law. California is home to one of the world's most developed ocean mining consortia, Ocean Minerals Company, of which Lockheed Ocean Systems is a member. In addition to developing a sophisticated technolgy for manganese nodule mining, the consortia is also conducting preliminary work on mining polymetallic sulfide ore deposits. If a nodule processing plant were located in California, reasonable estimates call for a potential increase in employment (approximately five hundred employees with total direct salaries of $12 million in 1980 dollars) and a larger tax base. Another possible benefit to the State from the ocean mining industry would be the high probability of Californians making up a large portion of the crews required to maintain mining operations and other transportation requirements for ocean mining consortia operating in the Pacific Ocean.

Other potentially valuable deposits of the sea bottom consist of the skeletal remains of marine animals. One familiar example is the large, ancient deposit of oyster shell in San Francisco Bay, which is the basis of industry producing cement, soil conditioners and poultry grit, with an annual output valued in the millions. Less well

known are the vast deposits over large areas of the deep sea floor of the skeletons of microscopic animals, some of which are nearly pure calcium carbonate, and which are quite similar in composition to the rock presently used for making cement. Other deposits consist of enormous quantities of diatomaceous earth.

The nearshore waters and beaches of the State provide a supply of sand, gravel and rock, all important to the multi-billion dollar construction industry. Certain deposits in Monterey Bay provide specialty sands that are not found anywhere else in the western part of the United States.

Freshwater from Desalination

Tremendous quantities of water must be developed to support the anticipated population growth and expanding economic development of the state. Saline water conversion offers great promise as a future supplemental source of water in certain areas of the State, especially the arid south.

The Department of Water Resources has a Saline Water Conversion Program, provided for by the Cobey-Porter Saline Water Conversion Act of 1965. In addition, the University of California conducts saline water conversion research through its California Water Resources Center. With the cost of desalinating seawater approaching $800 per acre foot due to high energy costs, research efforts have more recently focused on brackish water and agricultural wastewater. As technological advances are made in the field of saline water conversion, it is expected that desalinated water will become more and more competitive with other supplemental sources. Seacoast communities would be the first to realize the advantages of desalinated water when supplemental water transported from distant sources no longer can provide additional increments of water economically.

The potential for an additional source of freshwater is found in undersea freshwater springs. The coastal strip is typified by interruptions of geological strata and by termination of acquifers.

WASTE REPOSITORY

The sea along California's coast is a convenient place to get rid of waste heat from power plants and to dispose of a large variety of industrial and domestic wastes. Because of rapid mixing and the large volume of water, the ocean dilutes wastes relatively quickly and the organic constituents are decomposed by marine bacteria. However, it is possible in nearshore waters, and especially in semi-enclosed bays and estuaries, to introduce wastes at a rate so great that dilution and decomposition are too slow to prevent the concentrations in the ocean from reaching harmful levels.

Municipal wastewaters are the principal point source of most of the pollutants entering California coastal waters. During 1980 and 1981 the flow from five southern California ocean dischargers averaged over one billion gallons per day and contained 610 metric tons of suspended solids.

Some of the more toxic materials challenge the assimilative capacity of the vast high seas. The most notable of this class are the radioisotopes, the introduction of which into the sea has been approached with great caution. Other materials, such as tetraethyl lead from the combustion of motor fuels, synthetic detergents, heavy metals, and some pesticides, are building up in the open sea in measurable amounts. The ultimate effects of this buildup cannot now be forecast.

In January 1969, an offshore well in the Santa Barbara Channel blew out and released 33,000 barrels of crude oil; in January 1971, tankers collided near the Golden Gate Bridge and spilled 20,000 barrels of Bunker C oil into the San Francisco Bay; and, in December 1976, a tanker blew up in Los Angeles Harbor, spilling 22,000 barrels of Bunker C oil. While spills of this magnitude are infrequent, their expected incidence can be statistically predicted. From data available, the Pacific Region OCS Office of the U.S. Bureau of Land Management has computer-projected oil spill accident rates for operations in the Lease Sale 48 (Santa Barbara Channel) and 53 (Point Conception to the Oregon border) areas. These rates (number of spills of 1,000 barrels or more per billion barrels of oil handled) were applied to quantities of oil expected to be produced, pipelined and tankered in the lease sale areas over the approximately 20-year life of the fields. In Lease Sale 48, five spills of 1,000 barrels or more are predicted.

Rather than a unique combustion technology, at-sea incineration is a different approach to waste incineration using existing technology, usually a liquid injection unit mounted on a ship. Highly toxic wastes are burned in the incinerator at locations in the open sea away from populated areas and shipping lanes. Proponents claim that the necessity for the removal of acidic gas from the emissions is eliminated since the gases can be dispersed over the ocean without measurable effects to people or sea life. Three at-sea burnings of large amounts of toxic organochlorine wastes on a commercial incinerator ships have been carried out since 1974. The third of these burns included the highly toxic herbicide, Agent Orange. The primary advantage of at-sea incineration is that it takes place far from populated areas. Disadvantages are the necessity for operating on-shore facilities for handling and loading the wastes, the possibility of at-sea disasters causing spills and potential problems in adequately monitoring at-sea operations.

HIGHWAY FOR COMMERCE

Another ocean use is the transport of commercial cargoes. A recent study, conducted for the Pacific Merchant Shipping Association, reveals that the maritime industry contributes 8.2 billion dollars annually to the California economy. According to the study report, California's waterborne trade increased by 56 percent since 1971, with containerized trade up 28.9 percent. Statewide, the maritime industry gener-

ated 138,000 jobs earning 2.9 billion dollars in 1981 and an estimated 143,000 jobs earning 3.1 billion dollars in 1982. In addition to generating 8.2 billion dollars in gross sales in 1981, the maritime industry paid 380 million dollars in state and local taxes.

Shipping constitutes an intense use of coastal waters, especially in the vicinity of major ports. Ship accidents, especially those involving hazardous cargoes, are a serious concern for coastal communities, ports and other ocean users. Improvements in navigation and vessel traffic systems to promote safe operations are key to accident prevention. In addition to accidents, many tankers and other ships that carry oil as fuel discharge oily wastes in coastal waters, even though stringent prohibitions have been enacted. Some seaborne cargoes, such as liquefied gases and bulk chemicals, can create serious fire and explosion or toxic release hazards if the ships are operated improperly or proper precautions are not taken at terminals. Finally, development and expansion of marine terminals and increasing industrialization in coastal regions are affecting many land use decisions in coastal area.

Since 1976, the level of vessel traffic has increased dramatically throughout southern California, an increase of approximately 40 percent in the number of vessels calling on the Ports of Los Angeles and Long Beach. Between the years of 1976 and 1981 the total number of vessel arrivals rose from approximately 5,000 to over 7,000 per year.

Several new large coal export terminals are in various stages of planning and development in California. Western coal reserves in the United States are large and capable of massive expansion of production. Difficulties with efficient transportation from the mines to the west coast ports have hampered development to date. However, reasonable projections call for large quantities of coal to be exported over the next decades to Japan, Korea and Taiwan. Some of the terminal plans include foreign ownership and investment in the facilities as well as long-term contracts for supply. The new marine terminals will require either connections to railroads or complete systems such as coal slurry pipelines from mines to ships.

MARINE RECREATION

California's ocean area provides a multitude of recreational activities for the State's 24 million people, the majority of whom live within 20 miles of the coast. Day use of California's beaches includes: swimming, sightseeing, photography, sunbathing, fishing, beachcombing, scuba diving and surfing. In 1966 there were nearly 60 million visitor days; it was then estimated that there would be approximately 90 million visitor days by 1980. However, Department of Parks and Recreation statistics show 140 million participation days in 1980. (A participation day is defined as one person taking part in any recreational activity for any part of one day.) State Parks calculated about 60 million people visited state coastal parks, not including federal or local government operated parks, in 1980. Over 33 million one-day or overnight trips were made to the coast and 50 million people attended Los Angeles County beaches. While reliable data on visitor expenditures in coastal areas is not readily available, it was estimated over $17 million was spent in coastal communities in 1980.

It was not too long ago that the planning for the State's shoreline parks ended at the high tide line. However, the offshore or marine portion of a coastal park is actually an extension of the terrestrial area. The beach or intertidal zone is merely the transition point between the two. A prime example is Jughandle State Reserve in Mendocino County with its series of marine terraces, known as the Ecological Staircase, which extends offshore with another step in the staircase at the depth of thirty feet.

Some twenty years ago, the State Department of Parks and Recreation became aware the underwater area surrounding the Point Lobos State Reserve contained special and unique natural values. The Department acquired title to 774 acres of the offshore area from the State Lands Commission and on July 1, 1960, the State Park Commission officially recognized the marine lands as an addition to the Reserve. The State's first rules and regulations for managing an underwater area were also adopted at this time.

Seven categories of protected marine environment have been established off the California coast by the state and federal governments in order to safeguard marine habitats or resources within them from impacts that could diminish their value. The State of California administers four categories of protected marine environments: areas of special biological significance, state oil and gas sanctuaries, underwater parks, ecological reserves and marine life refuges. The federal government administers three types of protected marine areas: national parks, national marine sanctuaries and ecological preserves.

With the advent of the federal Marine Sanctuary Program, California receives the benefits of this protective designation around the Channel Islands and the Farallon Islands - Point Reyes area. The Channel Islands Sanctuary, which was designated by President Carter in 1980, includes five belts, each six miles wide, surrounding San Miguel, Santa Rosa, Santa Cruz, Anacapa and Santa Barbara Islands. Farallon-Point Reyes and Channel Islands are the only two federal marine sanctuaries that include a prohibition on new oil and gas activity, although the existence of the Channel Islands Marine Sanctuary, and retention of its oil and gas prohibition, are now being challenged by the oil industry.

THE OCEAN'S IMPACT ON LAND

Weather and Climate

The ocean's great effect on climate can be seen by comparing temperature ranges in coastal cities and inland areas of the same latitude. The interaction between air and sea is also responsible for some of the inconvenient and disagreeable phenomena experienced in California. Depending on season and location, "flood," "drought," "fog" and "smog" are household words in one part of the State or another. There is little that can be done about these things at present. As the workings of the great heat engine of air and sea are better understood, some control in modifying the rainfall pattern and other weather may be possible.

One example of the economic benefits of oceanographic research is in the field of long range weather forecasting. Recent meteorological studies show that changes in world weather patterns are closely related to changes in the temperature distribution of the water layers near the surface of the sea. These observations indicate that improvements in long-range weather forecasts can be made through studies of the large-scale interactions between the oceans and the atmosphere. If the present accuracy were improved, forecasts for planting and harvesting crops, for planning seasonal fuel transportation and storage, for the timing of building and road construction, and for flood and drought protection would provide great savings.

Shoreline Erosion

Because of sea level changes and regional tectonic warping of the North American continental land mass, the California coastline has been eroding for thousands of years. Data derived from tide-gauge stations throughout the world indicate that the mean sea level rose by approximately 12 centimeters in the past century. If predictions of global warming are correct, with the consequent melting of polar ice caps, a continued rise of sea level is likely in the near future.

Winter storms, coupled with periods of high tide, have devastating effects on the California coast. Presently, beach erosion and bluff retreat is occuring over approximately 85 percent of our shoreline. Many coastal residential areas, such as those in Marin, Santa Cruz, Ventura, Los Angeles and San Diego Counties, have experienced damaging waves many times over the years. From December of 1977 through mid-March of 1978, a series of severe storms battered the California coast. The cost of damages throughout the State (inland and coastal) was $238,000,000. Along the coastline, from Del Norte to San Diego County, high waves and tides accompanied by a storm surge, caused more than $18,000,000 in damage to man-made coastal developments.

As long as sea bluffs and coastal areas were left undeveloped or were used primarily for agriculture and low-density recreation, erosion did not present major economic or public safety problems. When the first permanent structures were built, vacant land was still relatively plentiful and houses were commonly located in stable areas, away from the most vulnerable parts of bluffs, canyons and floodplains. As coastal areas become more densely populated, the number of stable lots declined. The desire for beautiful ocean views, convenient beach access, land speculation and prestige has induced many people to build at the ocean's edge and bluff-top development has accelerated over the last two or three decades. The resulting seawalls and other slope protection devices have often resulted in the loss or degradation of many coastal bluffs and marine intertidal areas. At the same time, lessened erosion, the result of a few relatively mild winters, lulled property owners into believing their land was stable. Therefore, expensive residential structures have been built in high-risk locations. For such dwellings, each severe winter storm is a potential disaster.

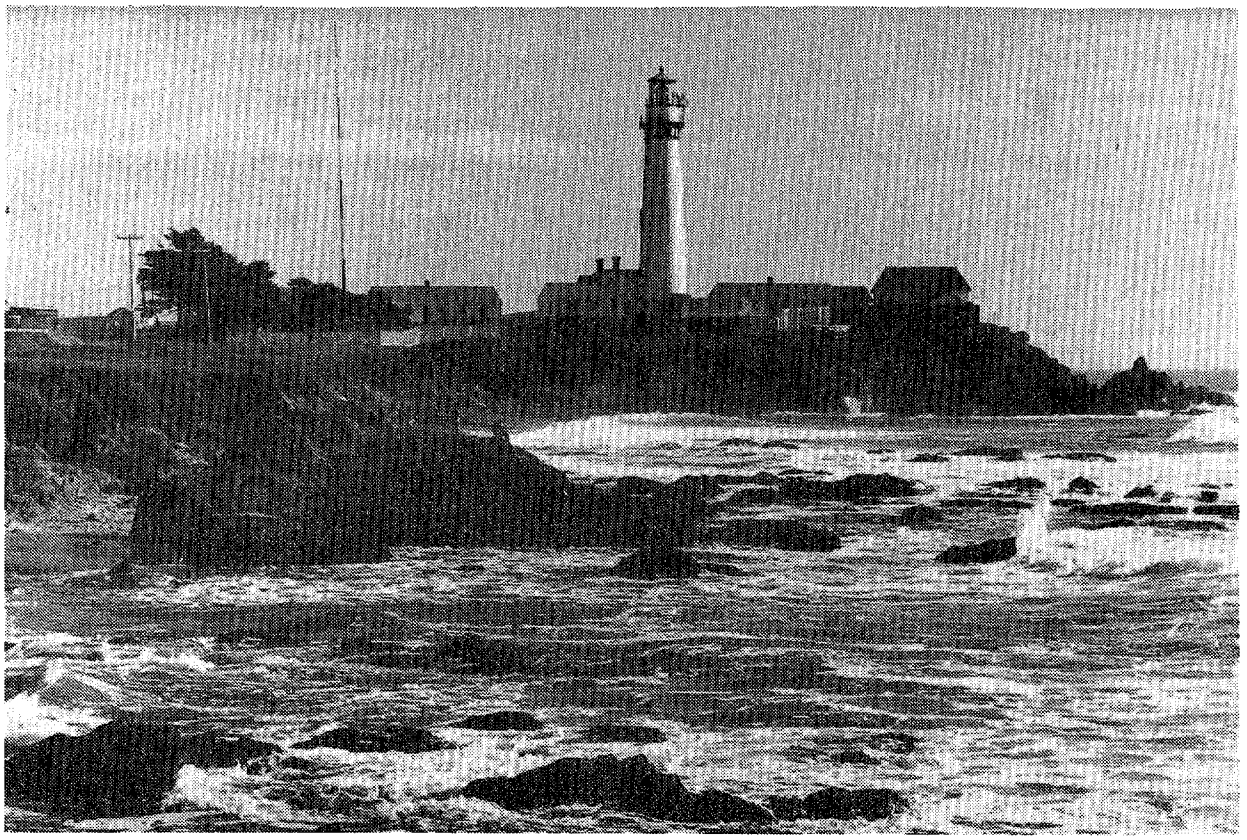
Winter is the time of the largest waves, enhancing the effect of rainfall on coastal slope stability by rapidly removing landslide toes and protective beach sand. The alignment of the northern California coastline exposes it directly to waves generated by storms in the north Pacific and it experiences the most powerful wave conditions

in the State. Waves up to 44 feet have been recorded near Crescent City and Waverider buoys installed outside Humboldt Bay have recorded wave heights of over 23 feet. Most spectacular of all, waves breaking against Trinidad Head in December 1914 produced run-up which rose to the lamp housing on the lighthouse at an elevation of 196 feet! When these wave conditions coincide with high tides and storm surges, their potential effect can be catastrophic.

Tsunami potential is also considerable along the north coast. In 1964 Crescent City was inundated by tsunami waves up to 21 feet high generated by the Alaska earthquake, causing eleven deaths and about nine million dollars worth of damage.

Saltwater Intrusion

Just as freshwater springs exist under the seafloor, the saltwater of the sea occasionally intrudes into freshwater coastal aquifers. In certain areas of the central coast, saltwater intrusion caused mostly by the overdrafting of groundwater basins has affected the water quality of drinking water and agricultural irrigation water.



Pigeon Pt. Lighthouse, San Mateo County

OCEAN RESEARCH AND NEW TECHNOLOGIES

Over the past several decades oceanography has yielded a treasure of knowledge about the ocean and its resources. Once seen as relatively static, the ocean is now seen as a dynamic environment actively affecting climate, geology, food and resource supply and environmental quality. Continued ocean research and monitoring for further understanding its influence on the earth has become a vital endeavor.

One example of such research is the California Sea Grant College Program, a statewide multi-university program of marine research, education, and advisory services, administered by the University of California Institute of Marine Resources. Sea Grant-sponsored research contributes to the growing body of knowledge about coastal and oceanic resources and to the solution of contemporary problems in the marine sphere. The program also transfers information and technology developed in research efforts to a wide community of users in California, the region, and the nation.

Technology development programs are for the most part supported and funded by the private sector and the federal government. These efforts include the design, construction, testing and deployment of hardware and other oceanographic equipment. Federally supported technology systems used in oceanography include ships, submersibles, remotely operated vehicles, buoys and moored systems, equipment and instrumentation, satellites, aircraft and oceanic data systems.

Timely, accurate information from satellite remote sensing systems and hydroacoustic systems are needed by fishermen and fisheries management agencies to enable fishermen to maximize their catch per unit effort and to allow resource managers to determine the parameters of a prudent catch level. Fishermen and managers are able to use coastal zone color scanners, infrared radiometers, scatterometers and altimeter information to describe upwelling and sea conditions associated with the migratory patterns of selected species of fish.

The importance to California fishermen of long-term marine research is best seen in the ongoing California Current Oceanic Fisheries Investigations (CalCOFI), a joint program conducted by the California Department of Fish and Game, the National Marine Fisheries Service and Scripps Institution of Oceanography. A 30-year data set obtained from this effort assists managers in making sound management decisions regarding species which inhabit the California Current.

The ocean realm is truly a new frontier, with no end to the proposals advanced for the future. In addition to floating coastal cities, the ocean has been eyed as a site for offshore power plants, airports, tanker terminals and energy farms. Many of these proposed developments will prove incompatible with other ocean uses; others may become an integral part of future life.

Section II

MAJOR MARINE RESOURCE ISSUES

Over 90 speakers addressed a wide variety of technical subjects and management issues during the first two days of the Ocean Studies Symposium. The third day was reserved for core group deliberations. The technical and management presentations were made by members of the following panels: The Law of the Sea Conference and the National Role in Marine Resources Management; Federal/State/Local Responsibilities in Marine Resources Management; Aquaculture; Commercial and Sport Fisheries; Marine Mammals; Marine Sanctuaries, Underwater Parks and Refuges; Offshore Energy and Mineral Activities; Marine Transportation; Marine Pollution; Shoreline Erosion; and Management Tools — Research, Conflict Resolution, New Approaches.

In order to avoid concurrent sessions and to cover all the material available, speakers were limited to five minute presentations and asked to address only the most important points of their subjects. A panel moderator was selected to help focus the speaker's presentations for the most effective use of the limited time and to facilitate the general audience question and answer periods that followed each panel.

The panel moderators met with their panel members after the presentations to prepare summaries for use by the core group. These moderators' summaries and the policy papers are the basis for the material presented in this section. This section contains the highlights of the panelists' discussions, the issues addressed, potential conflicts and problems that were identified and, where applicable, solutions offered for future consideration and use.

The opening session of the Symposium was a brief overview of the current roles and responsibilities in marine resource management of the state government agencies. This material is not presented in this section; each agency provided a statement of its duties which is included in Appendix E.

There were two recurring points in the panel presentations. One, there is a serious problem with overlapping jurisdictions and lack of coordination between some state and federal management agencies. Two, there is a crucial need for additional, precise data geared for use by decision-makers.

The first panel, after the overview of the responsibilities of California's management agencies, was on the Law of the Sea Conference and the National Role in Marine Management.

LAW OF THE SEA CONFERENCE AND THE NATIONAL ROLE IN OCEAN MANAGEMENT

This panel addressed questions of global marine resource management. The international Law of the Sea (LOS) negotiations were the primary topics of discussion with papers in two main areas: 1) the status of LOS international negotiations, and 2) the potential effect the work of the Law of the Sea Conference could have on government management of the world's ocean resources. International laws and approaches to ocean resources management are crucial to California because of its

possible expanded jurisdiction due to extension of the territorial boundaries and other related issues.

The panelists discussed the following in their presentations:

- An increasing number of coastal nations are claiming expanded territorial jurisdiction which is causing conflicts over fishing rights, freedom of navigation, deep sea-bed mining, pollution, etc.

- The Law of the Sea negotiations have attempted to resolve conflict in ocean management issues on a global scale.

- The most controversial issue of the recent Law of the Sea Convention was the exploitation of deep sea-bed mineral resources. The LOS Treaty is based on the premise that the deep sea-bed mineral resources are a "common heritage" located beyond "national jurisdictions" and should be used to "benefit all of mankind." The developing nations and the western industrial nations have disagreed over the "common heritage" versus "free enterprise" philosophies.

- The United States and several other industrialized nations chose not to ratify the LOS Treaty primarily because of treaty provisions which limit free enterprise in deep sea-bed mining. The LOS Treaty would assign half the manganese nodule mine sites to a new international sea-bed authority and the other half to private companies subject to payment of fees, provisions for the transfer of technology, and a 20-year limitation on the amount of sea-bed protection that would be permitted, lest land based producers of the same mineral be unduly harmed.

- The LOS Treaty provisions are comparable to existing conditions for foreign land based mining operations in such areas as Indonesia and parts of South America. While the LOS Treaty would place restrictions and financial liabilities on private mining companies, these restrictions cannot be more onerous than those currently on American resource development companies which still make a reasonable profit.

- The United States has decided not to sign the Law of the Sea Treaty. The Reagan Administration wishes American based ocean mining firms to proceed with extraction of deep sea-bed mineral resources. Many non-government experts believe it doubtful there will ever be significant deep sea-bed mining outside the provisions of the LOS Treaty because of the lack of clear title to resources from the deep sea-bed in controvention to the essentially universal Treaty.

- The issue of California's potential role in deep sea-bed mining was analyzed. As a coastal state in the area nearest to the largest sites of maganese nodules, California is a strong candidate as home port for ocean mining ships, land based processing and refining facilities.

- There is pending legislation to create a 200-mile exclusive use zone which would establish the U.S. claim to "sovereignty" or ownership of all resources within the zone for the first time. The principal difference between the proposed legislation's exclusive use zone and the 200-mile zone established by the LOS Treaty is that the U.S. plan would not require the allocation of fisheries surpluses to foreign countries. This issue of resource ownership is

important to California since it may affect the allocation of fees levied for foreign fishing allocations in the Fisheries Conservation Zone (FCZ) under the Magnuson Fisheries Conservation and Management Act (MFCMA).

- The United States recognizes a three-mile territorial sea boundary for the ocean waters surrounding the U.S. and the other coastal nations. United States sovereignty is established within the three miles and the Submerged Lands Act generally grants jurisdiction to U.S. coastal states within these three miles. (In a few specific cases such as Texas and Louisiana, special treaties override the Submerged Lands Acts.) The United States has declared the waters between three to twelve miles as a "contiguous" zone. Sovereignty in this nine-mile area has not been claimed, but the United States does enforce numerous laws such as policing drug traffic, pollution control, navigation laws, and fisheries regulations in this zone. The Truman Proclamation (1945) and The Outer Continental Shelf Lands Act declared that mineral resources to the edge of the continental shelf are the property of the United States. Therefore, any use of mineral resources from three miles to the edge of the continental shelf requires a lease from the federal government. The U.S rights claimed in this area are more limited than those under complete sovereignty within the three-mile territorial sea.

- The recently adopted Law of The Sea Treaty includes a provision which directs coastal nations to adopt a universally recognized twelve-mile territorial sea boundary. If the United States decides to follow the direction of the Law of the Sea Treaty, U.S. sovereignty, now limited to three miles would be extended to twelve miles. In the event a twelve-mile territorial sea is adopted, it is possible the Congress will consider amending the Submerged Lands Act and the OCS Lands Act to extend the jurisdiction of U.S. coastal states from three to twelve miles.

- An extension to a twelve-mile territorial sea could have important ramifications for California. If new jurisdiction between three to twelve miles is given to California and other coastal states through OCS and Submerged Lands Act amendments, there is potential for increased state income and increased regulatory authority over the use and protection of the ocean resources in this area. Also, there would be vast new state responsibilities with associated costs for the management of this huge additional ocean area.

- The issue of extending the jurisdiction of U.S. coastal states to twelve miles is complicated. State and local interests must be reconciled with the need for uniform national regulation and the need for equity between California (rich in resources) and other states.

- Some of the panelists felt there would be no real advantage to California in extending states' jurisdiction to twelve miles. The whole concept of fixed division between federal and state jurisdiction was questioned. Rational division of marine resources management responsibility has always proven difficult partially because of the three mile limit.

- There is a great need for a single comprehensive ocean use and management policy. As yet this has not been accomplished by federal action and it may not be possible. It does appear possible to have clearly stated federal/state management goals for particular ocean areas and to develop a federal/state partnership to achieve these mutual goals in the most efficient manner.

As the issues were discussed, the panelists also presented suggestions, ideas for possible solutions, outlined conflicts and problem areas and detailed some steps needed for resolution. These points follow:

- Coastal nations' continued expansion of territorial jurisdictions can cause a significant loss of fishery resources, mineral resources and the freedom of navigation to other countries. This is of particular concern for those nations with little or no coastline.

- The LOS negotiations have attempted to exercise conflict resolution at an international level. Some conflicts may not be resolved with any concensus because of the vast differences in the philosophies of developing and industrialized nations. There is a need for ongoing international conflict resolution efforts on marine resource management issues, including the review and revision of existing treaties on a regular basis to maintain their relevance in a changing world.

- If deep sea-bed mining does occur off the Pacific coast, California could provide ports for ships and locations for processing minerals. While this would enhance California's economy, mineral processing requires new facilities, large land areas and vast amounts of water. Numerous pollution problems can result from the mineral operations. A legislative or governor's task force of government and industry ocean mining experts could be convened to determine whether the State should actively encourage ocean mining concerns to locate in California. The issues of site location, pollution and potential economic loss or gain to the State should be assessed in a preliminary fashion now while such mining is still in the development phase.

- If national ownership of all resources within 200 miles becomes law, how will a management system with an equitable and resource-conserving price structure be established? A fair and sound pricing structure for living resources taken by foreign fishermen within 200 miles of California needs to be established. This might be possible through a joint federal and multi-state effort.

- All panelists agreed that the extension of coastal state jurisdiction to twelve miles is a very complicated political and resource issue. One panelist suggested California take the initiative and strongly encourage Congress to establish a national commission modeled after the former Stratton Commission to make future national legislative recommendations on expanded offshore jurisdiction for coastal states.

- Legislation mandating federal OCS revenues be shared with coastal states is now being considered by Congress. Panelists expressed two different opinions about the use of these funds. One opinion was that the funds should be given to states on an interim (approximately three-year) basis to carry out marine resource management until such time as the questions of federal/state management of offshore resources is clearly resolved. An alternate point of view was that coastal states be given a long-term guaranteed share of OCS revenues which would allow meaningful state participation in a federal/state partnership for management of ocean resources in the expanded boundary. It was suggested the California Legislature develop a policy on the possible extension of state jurisdiction from three to twelve miles and the potential use of OCS revenue sharing funds.

- The panelists' preference for a strengthened federal/state partnership, one not limited by an arbitrary boundary, at either three or twelve miles, was evident.

STATE/FEDERAL/LOCAL RESPONSIBILITIES IN MARINE RESOURCES MANAGEMENT

This panel discussed the various roles and interaction of the federal, state and local governments in the management of ocean resources. Many of the issues addressed were first introduced at the Symposium by the Law of the The Sea panel. Discussion centered on the following:

- Several panelists expressed the need for a strong ocean policy at national and state levels. At both levels, the management of marine resources is divided among several agencies. Each agency now bases its actions on established policies which may result in conflicting objectives.

- There is a need for a clearer prioritization of policies affecting marine resources use and management.

- Improved coordination and communication between and within federal and state agencies with authority in marine matters will promote more effective and efficient marine resources management.

- Any state approach to marine resource management must provide predictability to the private sector, specifically:

  a) broader consensus on "externalities" (e.g. environmental issues) that must be addressed by the private sector,

  b) reduced fragmentation of governmental authority, and

  c) assurances regarding future restrictions on specific enterprises.

- Any state approach to marine resource management should recognize that local government must have a role, albeit limited. It must also recognize that traditional local planning and regulatory approaches will have to be modified if local governments are to be able to deal, even on a limited basis, with marine resource issues.

AQUACULTURE

Currently world ocean fisheries landings are approximately 72 million metric tons (MMT). The maximum sustained yield, or the total havest capabilities without causing

adverse effects to the resource, is projected to be 100 to 120 MMT. It is also projected that the maximum sustained yield will be reached or exceeded in 25 years. In the upcoming years, aquaculture will become more and more crucial in the production of marine plants and animals. This panel addressed some of the important types of aquaculture activities in California and some of the problems and challenges the industry faces. Among the issues discussed were:

- If salmon ranching is conducted, should it be done by the State or the private sector? Or not at all?

- Existing natural fishery stocks will not sustain future demands. Therefore, aquaculture expansion should be promoted and supported to help supplement the demand for aquatic food products.

- The waters of California from Point Lobos north to the Oregon border have been closed to commercial fishing for abalone since 1945. Abalone is in high demand and the aquaculture industry can make an important contribution to the supply.

- The state and aquaculture industry need to focus cooperative effort on successful implementation of recent aquaculture legislation (SB1917) to promote the growth and development of the industry.

- Federal agencies given primary responsibility under the Federal Aquaculture Development Act need greater support from the federal government in order to carry out the intent of the Act in promoting the development of aquaculture.

- A major issue facing aquaculture is user conflict. Prime sites, such as sheltered bay areas, are under increasing demand for urban development and recreational use. Public pressure to exclude aquaculture when it conflicts with recreational activities precludes use of valuable marine resources for future food production. A great potential in expanding aquaculture production is access to semi-closed, land-based facilities on the open ocean. The need for coastal sites and locations adjacent to environments where the cultured organisms naturally occur will become more acute in the future.

The panelists outlined some potential methods of resolution of current problems facing the aquaculture industry:

- Reevaluate waste discharge regulations for aquaculture activities.

- Evaluate industry need for open ocean frontage.

- Obtain broad zoning ordinances to allow access to diverse aquaculture operations.

- Provide aquaculture information to local and state planners for use in assessing the industry's social benefits and costs.

- Aquaculture efforts are necessary to supplement or replace diminishing natural stocks, such as abalone.

COMMERCIAL AND SPORT FISHERIES

A vast spectrum of issues and conflicts exist concerning marine fisheries. This eight-member panel was able to address only a few of the numerous marine fishery problems facing California's users and managers. While significant issues were discussed, the presentations of this panel must not be construed as a complete or objective summary of all crucial fisheries issues.

Historically, the bulk of the harvest of California's local fisheries consisted of sardines, mackeral, albacore, salmon, bluefin tuna, used primarily in canning, and a few fresh market species such as barracuda, sole, rockfish, white seabass and halibut. An important characteristic of the harvest of fish from the California Current is that, although over 60 kinds of fish and a score of invertebrate species are included, several species consitute most of the catch.

The Pacific sardine dominated the commercial catch until the mid-1940's when the fishery collapsed. Since that time, the tuna fishery has been the mainstay of the California fish canning industry although most tuna landed in California are caught from foreign waters or the high seas. Currently, California has important fisheries in king and silver salmon, dungeness crab, various shrimps, rockfishes, mackeral, bonito and numerous species of bottomfish. All of these fishery resources are marketed fresh, frozen or canned.

The main issues the panelists discussed included:

- Some species, such as salmon, may be yielding at or above maximum sustainable harvest. A few, such as white seabass and bonito, have been overharvested and are now at reduced levels. Other species are currently underutilized and the harvest of these fish populations could be increased. Some of these presently underused species are less popular with domestic consumers and may provide export products.

- Currently a limited entry program is used by the California Department of Fish and Game as a management technique with the commercial abalone harvesters. A limited entry program can be controversial but can also provide an effective means to deal with some fisheries which are now experiencing diminished stocks.

- Forage fish stocks are a part of the source material for the reduction industry in the production of fish meal, fertilizer, oils, etc. These forage fish also play a crucial role as a food source for some of the more commercially valuable predator species. There is currently a debate over the value of forage fish to the reduction industry versus the ultimate value if they were not harvested, but left in the sea available as food for the predator fish. An example of the importance of fish for forage is the current federal management plan for anchovy, a principle forage fish off California. The plan is designed to set aside a minimum reserve of anchovy, with the annual harvestable quota set at one-third of the estimated spawning biomass in excess of the minimum reserve (including forage).

- According to the National Marine Fisheries Service in 1981, salmon was the second most important fishery resource in the United States in terms of both

quantity and value. California's streams, rivers, and ocean waters make a substantial contribution to the U.S. salmon resources. Wild populations of salmon have dropped substantially for a variety of reasons including damage to coastal streams from erosion, dam construction, water diversions and heavy fishing. The maintenance of a viable stock of wild salmon is essential to the preservation of the genetic diversity of salmon.

- A large part of the salmon caught off the California coast are wild fish. However, hatchery stocks may be becoming a more significant part of the catch. Hatchery born salmon are released to the sea where they mix with the wild stocks. Thus, salmon captured at sea are a combination of wild stocks from numerous different streams and hatchery reared fish.

- Fishery experts do not agree on the effect hatchery production has on the natural populations of salmon. Some believe that hatchery production augments natural populations by adding more stock to the fishery; others think that hatchery production has or will cause direct or indirect declines in natural salmon production.

- The decline in natural salmon production can be associated with the increase in hatchery production in several ways. Because there are substantial numbers of hatchery reared salmon available for harvest at sea, the fishing effort is high. This can result in a harvest rate that is sound for hatchery fish but exceeds the level of catch desirable for wild stocks, and can cause a potential loss of genetic diversity by the overall reduction of the natural salmon population. With the mixture of natural and hatchery populations, interbreeding will occur which could cause a reduction in the adaptability of the offspring to the natural environment.

- At the same time, it must be recognized that public hatcheries take fish from the same gene pools as natural spawners and that there is a natural straying of stream-produced fish that tend to mix the gene pool.

- There are enormous conflicts involved in managing multiple natural stocks of salmon augmented by hatchery releases.

- Ocean ranching of anadromous fish involves the release of hatchery reared fish to the sea after they have been "keyed in" to a stream at their release point. After being available at sea for public harvesting, the remaining mature fish return to their home stream where they are harvested by the ocean ranch operator.

- Salmon trollers are concerned about the marketing impacts of widespread salmon ranching on their occupations. There is currently only one experimental salmon ranching operation in California but several in Oregon. There is a developing controversy over the ranching of anadronous fish with both real and perceived conflict between salmon trollers and ocean ranching operators.

- The problem of allocating limited fishery resources between recreational and commercial fishermen is the subject of considerable debate at state, multi-state and national levels of fisheries management. The many management agencies involved often have overlapping or conflicting jurisdictions over fishery resources and unnecessarily complex regulations.

- The necessary data to make sound fishery management decisions is not always available to management agencies.

- Many California fishermen do not feel that they are adequately represented on the Pacific Fisheries Management Council and that California should have its own management council or that all management should be handled by the Department of Fish and Game.

- The Pacific Fisheries Management Council was criticized for failing to provide the coordinated, responsive management for which it was created; this appears to be especially troublesome for salmon resources.

- The proper management of a fishery requires an understanding of the basic population structure of the species involved. Information is needed on the number of individual breeding populations supporting the fishery, both sport and commercial, as well as size and location of the stocks.

- Landing figures needed for assessment of fish stocks and management strategy are compiled and available to Department of Fish and Game staff in unpublished form through 1981. Published fish landings for California are currently available through 1976 in the Department's "Fish Bulletin". While most of the unpublished backlog will be published in 1983, there is a need for additional resources to complete some segments of the fisheries data.

- Long-term research, such as the California Current Oceanic Fisheries Investigations (CalCOFI) program, is important for sound management decisions and funding for these programs must be assured.

- The potential benefits to the fishing industry of recent developments in remote sensing and hydroacoustics have not yet been fully defined.

The panelists discussed special conflicts and problem areas and suggested some methods of resolving them. This discussion is outlined below:

- Marketing programs to educate consumers and increase demand will be needed to make the harvest of presently underutilized fish stocks economically feasible.

- An analysis should be done to determine the relative value of forage fish for source material to the reduction industry versus as a food supply for valuable predator fish. The results of this study should be used to set quotas on the take of forage fish as is done with anchovy, the primary species harvested in California for reduction; it is managed on a quota basis with allocations for forage, live bait, spawning reserve and reduction.

- California urgently needs a strong fisheries management policy which establishes strategies to assure long-term future natural salmon production. All research needed to provide a genetically sound management philosophy should be pursued.

- Ocean ranching will continue to be a controversial issue in California until a state policy is developed. This is closely linked with the need to assure long-term natural salmon populations.

- Better coordination and communication between management agencies and user groups are needed as are similar mechanisms between the diverse user groups. Simplification of regulations and interagency coordination are essential.

- The increasing number of fisheries/marine mammals conflicts require a holistic management approach. This will involve improved communication and policy discussion by agencies with marine mammal and fishery management responsibility, the fishing industry and the marine mammal protection organizations.

- Private sector concerns need to be addressed when developing statewide fishery management policies.

- There is need for multi-species management.

- Improved catch and fishing-effort data are needed to provide a factual basis for resolving conflicts of interest over the utilization and allocation of living marine resources. The Department of Fish and Game should be given the necessary resources to accomplish this.

- Information, such as that currently being done through the National Council for Gene Resources, and further research is needed on genetic implications of management strategies. This research is needed to develop an informed salmon management policy.

- Greater industry participation should be included in the design and implementation of improved high technology tools for aiding fishermen and resource managers.

MARINE MAMMALS

This panel touched on some of the issues of marine mammal management in California waters. Speakers addressed the growing populations of some principal pinniped species, sea otters and their relationship to other marine resources, data on marine mammal and sea bird population and a marine mammal stranding network.

The issues discussed by the panel included:

- Marine mammals in California's ocean waters are protected by several conservation laws. After the near eradication of certain marine mammals from hunting, increased protection has allowed populations to flourish. The most dramatic increase has been with Northern Elephant Seals, increasing about 14% per year. Other pinnipeds, such as California sea lions, northern fur seals, Guadalupe fur seals and harbor seals, are also increasing but not as rapidly as the elephant seals. Sea otter populations also appear to be increasing, but there is disagreement among experts as to how quickly. Populations of California grey whales and other cetaceans have also been increasing, but not at the rate of the pinnipeds.

- The return of marine mammal populations to their former numbers is evidence of the effectiveness of the conservation laws, but there will continue to be conflicts and changes that must be addressed by management agencies. These include shifts in ecosystem structure and relative species abundance, conflicts with commercial and sport fisheries, favorable or unfavorable interactions with tourism, recreation, oil development, commercial shipping and military operations.

- The conflict between increasing marine mammal populations and commercial and sports fishermen involves damage to gear and to hooked or netted fish, and real or imagined depletion of catchable fish because of mammal predation.

- Fishing activities, especially the use of the entangling nets, will continue to trap and drown marine birds and mammals.

- In the Southern California Bight, where the ocean area is used by the military for training, operations and research, an increased mammal population is likely to result in greater disturbance to the mammals themselves and in potential interference with the military operations.

- As marine mammal populations increase, a greater absolute number of animals would be subject to contamination by oil in the event of a spill.

- Public awareness of the large numbers of marine mammals in certain places could create greater problems of visitor control and increase the likelihood of disturbance to the rookeries.

- There is no doubt that the comeback of sea otter populations from their earlier near demise has had a significant effect on shellfish populations. There is enormous controversy over the level of damage to shellfish populations caused by sea otters. Also, there is no agreement on the current population of otters. Various proposed management schemes such as translocation and/or limiting population and range has caused various groups to support radically different positions on sea otter management.

The panelists outlined some problems and recommended actions for resolution. These included:

- With the federal government responsible for protection and management of marine mammals and the State with control of fishery resources, there is a jurisdictional dilemma which must be resolved if there is ever to be ecosystem, rather than single species, management.

- With the expansion of marine mammals into vacant habitat on southern California islands, there is an unparalleled opportunity to test ecological theories of competition and resource partitioning among several species.

- Marine mammal and fisheries interactions and conflicts require a comprehensive management approach. Seabirds also must be considered in the development of a comprehensive marine mammal and fisheries policy. Changes in fish populations will in turn affect marine birds and marine mammals.

MARINE SANCTUARIES, UNDERWATER PARKS AND REFUGES

The United States, with the National Park Service, and California, with the Department of Parks and Recreation, have established a long, solid committment to terrestrial parks and wildlife refuges. In the early 1970's a movement to set aside valuable and unique underwater areas along the nation's coastline began. This Symposium panel discussed some of the purposes and benefits of underwater sanctuaries, parks and refuges and some problems experienced in their management. The panel also discussed the importance of public education on marine management issues and the value of facilities, such as the Monterey Bay Aquarium, for educational purposes.

The topics covered by the panelists included:

- There are at least six different types of protective designations used by local, state or federal agencies for marine waters off California. These underwater parks, refuges and sanctuaries are often established with different objectives ranging from the prohibition of wastewater discharge and/or oil and gas production, to the facilitation of research and/or recreational uses. Despite the diversity of designations and the relatively high number of marine reserves, parks and refuges in California, few areas provide full protection of entire ecosystems.

- How well are underwater parks and reserves doing what they were created to do? How adequately are the areas protected?

- Underwater sanctuaries and refuges in California are actually multiple use areas where many activities can occur. While resources in some multiple use areas can be adequately protected, other areas are so unique or fragile that only very limited uses should occur. There is significant benefit in setting aside certain limited areas in an undisturbed state solely for research and maintenance of a reservoir of wild genetic materials.

- With the significant increase in the recreational interest in California's offshore waters by divers, whale and bird watchers, etc., marine parks provide an important leisure and educational resource for the citizens of California and the nation. The California Department of Parks and Recreation has started an important underwater park program and funding should be assured for its continuance.

- Park, sanctuary and refuge designation can limit or prohibit activities such as oil and gas exploration. This has been done in the Channel Islands and Farallon/Point Reyes Sanctuaries. The prohibition of oil and gas activities has caused opposition by the petroleum industry. In some cases, prohibiting such activities is necessary to preserve the wildness of an important marine area. Presently, a major group of oil companies is challenging the Channel Islands National Marine Sanctuary designation so that oil and gas leasing, development and extraction could take place in the preserve area.

Among the problems/conflicts and steps needed for resolution, the panelists addressed the following:

- There is a need to reevaluate the purpose of marine sanctuaries. Are there too many different types of designations?

- An inventory of all marine sanctuaries, park and refuge areas in California should be prepared to determine if representative marine ecosystems have been included and if existing management regulations and techniques are adequate to protect the areas.

- A comprehensive ocean management plan for California should include a strong program of underwater recreation, research and education areas.

OFFSHORE ENERGY AND MINERAL RESOURCES AND INDUSTRIAL ACTIVITIES

This panel discussed a few of the many innovative uses of the ocean for energy and mineral resource developement. Presentations ranged from discussion of oil and gas extraction activities to maganese nodule mining to the use of the ocean for alternative energy production.

- The State could benefit from a strong ocean mining industry in several ways, such as a greater tax base and increased employment. The principal concern in choosing a maganese module processing location is the distance from the mine site; mining is expected to be 2,500 miles off California's coast. Obtaining the necessary permits for a manganese nodule processing plant, especially for the discharge of tailings, represents a major challenge for the ocean mining companies. Some studies indicate that the mineral tailings can be handled in an environmentally acceptable manner, but large amounts of land and water would be needed. The legal aspects of ocean mining have not been resolved, leaving a cloud of uncertainty over future prospects. (Please see the Law of the Sea Section for a more detailed explanation.)

- One example of alternative energy from the ocean was "Dam-Atoll", a system which focuses incoming wave energy into a central core and converts that energy into electricity. The device, approximately 300 feet in diameter, is constucted of reinforced concrete and is moored along the coastline in water depths of 150 to 300 feet. Only 1/10 scale units have been tested; however, studies indicate "Dam-Atoll" could produce electrical energy at competitive rates in the future.

- Another example is ocean thermal energy conversion (OTEC) which is being tested at various locations around the world. The potential for economical use in California has yet to be determined.

- The production of oil and gas in California's offshore waters makes an important contribution to the State's economy and the energy supply of the United States. Oil and gas exploration and production can cause environmental damage on land and at sea. The oil industry has significantly improved its technical abilities in offshore operation, and there has been no major exploration or production oil spill in California since 1969. Major issues about off-

shore oil and gas operations still need to be addressed by the oil industry and government management agencies. Much work is now underway regarding oil spill prevention and clean-up, the effect of drilling fluids and cuttings, air pollution, the use of sub-sea completions, etc.

- Federal guidelines for offshore oil spill equipment have resulted in a greatly improved spill response capability by industry. There is still need for further refinement of equipment and techniques; the impacts of some techniques, such as dispersants, are disputed.

- Natural gas and oil seep containment is technically feasible and results in lowering of air and water-borne pollution. Less expensive containment equipment should be developed.

- Study design should be carefully tailored for the offshore oil and gas issues that require further ecological research. This is paramount because subtle changes in biological communities will be extremely difficult to identify against the background of significant natural changes.

The major problem areas and steps needed for resolution outlined by the panelists included the following:

- California should consider maganese nodule mining as a "special case" requiring the study of management alternatives for disposal of processing wastes, development of guidelines or regulations specific to marine mining, new research, active promotion or discouragment of industry activities and designation of potential sites for manganese nodule processing and waste disposal facilities.

- The State should develop a policy on experimental ocean energy devices and designate sites where their use would be acceptable.

- To develop a sound management strategy on the use and disposal of drilling fluids, the following aspects must be considered:

    a) chemical characteristics of drilling fluids and cuttings,

    b) conditions influencing upper plume (far field) dispersion,

    c) conditions influencing lower plume (near field), and

    d) considerations of generic mud concept in terms of assessing effects of drilling fluids and cuttings.

- There is a need to recognize the difference between oil reserves and oil resources in oil and gas management strategies.

MARINE TRANSPORTATION

Marine transportation makes a huge contribution to the economy of California, over eight billion dollars annually. The two most important port complexes in California are those of San Francisco-Oakland and Long Beach-Los Angeles. Planning for needed coastal port facilities and risk management for operations are critical components of any ocean management plan for California. This panel discussed some of the important marine transportation issues, such as the conflict between offshore oil drilling activities and vessel navigation, vessel traffic control systems and other marine transportation policies.

The issues addressed during the Symposium included:

- There are many conflicts between shipping and other users of coastal navigation (i.e., oil and gas, fishing, recreational) in ports and harbors as well as on the open ocean.
- There is concern about the safety of offshore oil and gas operations. What steps are being taken to improve/enhance operational safety?
- Should hazardous cargo such as liquefied natural gas, be handled at offshore terminals or at sites on the coast?
- How are conflict avoidance mechanisms in coastal waters and ports and harbors to be developed?
- How should California's government deal with marine transportation issues? Is a new agency such as a state maritime administration needed?

The panelists discussed potential solutions to the aforementioned problems such as:

- Develop mandatory traffic control schemes such as the vessel traffic system in the Santa Barbara Channel for the entire coast and harbors where major conflict potential exists.
- California should set up a state agency for maritime transportation. The State should work closely with national and international agencies responsible for improvement and maritime safety.

MARINE POLLUTION

This panel focused on some of the conceptual issues of marine pollution in California's ocean waters. The topics included research to determine ecological impacts, the assimulative capacity of the sea, the sea's use as a dumping ground, toxic, radioactive, domestic and industrial wastes.

The main points of the discussions were:

- The question of disposing toxic wastes and other pollutants at sea involves political, ecological, scientific, moral and economic concerns. To resolve these issues, a great deal of reliable data with sound analysis is needed as a basis for decision-making. Cooperation between management agencies and effective transfer of data from scientists to decision-makers is as important as the collection of reliable data. Although scientists emphasize the need for further information, this does not address the critical need for a decision making process to be used in the absence of conclusive data.

- A greater effort should be made to understand more completely the structure and dynamics of marine ecosystems. Different resources have different requirements — what is polluting to one may be stimulatory to another. Only by better understanding the dynamics of marine ecosystems can the ocean's multiple resources be maintained and waste disposal allowed.

- The marine ecosystem is too complex for large-scale population/community studies for predictive purposes. Therefore, every effort should be made to find, develop and perfect the use of indicator or "early-warning" species (i.e. mussels, sand crabs) for pollution study.

- A greater understanding of the relative influence of point source versus non-point source pollution is needed before effective management can take place.

- The potential for desalinating sea water should be reevaluated. If desalting plants are ever used, it will be necessary to study the effect of brine discharges on the marine environment.

- The State should consider management alternatives for disposal of manganese nodule processing wastes.

- The U.S. Environmental Protection Agency is considering revising regulations to allow low-level radioactive wastes to be dumped in the ocean.

- The U.S. Navy has proposed disposal of decommissioned, defueled nuclear submarines on the seafloor off the coast of northern California. The California Legislature is presently considering legislation directing the Coastal Commission, under terms of the 1976 Coastal Act, to use "all means available to prevent the dumping of radioactive waste in the ocean".

The panelists identified some potential solutions and outlined possible steps for problem resolution as follows:

- The State of California should consider preparing an assessment of the critical information needed for pollution decision-making and methods of communicating such needs to scientists and engineers. This would include, but not be restricted to: 1) an assessment of estuarine and continental shelf ecosystems; 2) an "eye to the future" assessment of chronic and/or long-term pollution problems and responses to perterbations of the marine realm, including radioactive waste disposal and long term "natural" ecosystem change versus man-induced change; and, 3) greater use of modern technical aids such as satellite monitoring. This study should include a re-assessment of continuation of data collection similar to that used in past studies; use of such data to make

environmental management decisions; and, the effectiveness of "older" or "traditional" approaches in decision making.

- Ocean resource managers should develop some method to evaluate the extent and gravity of a pollution problem before a vast, expensive resolution effort (or clean-up) is initiated. Time should not be wasted on "non-problems".

- A comprehensive ocean management program for California should include a framework for facilitating the exchange of accurate and meaningful information from scientists, engineers, planners and economists to the decision-makers and the public in a manner that can be easily understood and used.

- Predictive and modeling approach studies should be considered by management agencies in addressing marine pollution issues. These studies should do the following:

    a) focus on predicting currents and current systems. Such systems are vital to an understanding of the dilution, dispersal and general movements of pollutants in the marine realm,

    b) focus on predicting marine toxic levels and pollution concentration, and

    c) assure that such predictive models are appropriately chosen and that model parameters are known and match the data used.

- The cumulative effects of dumping nuclear and toxic wastes in the ocean must be considered in all actions by management agencies.

SHORELINE EROSION

The shoreline erosion panel discussed a variety of erosion issues and reached concensus on several major points. Shoreline erosion (beach erosion, bluff retreat) is occuring over 86% of the California coast. Attempts to halt erosion are fragmented, under the jurisdiction of numerous state and local government agencies, and often at odds with the public desire for building on scenic but unstable land.

The issues discussed by the panelists included:

- Shoreline erosion problems transcend political boundaries and are often multi-jurisdictional. The magnitude and relative importance of the various problems vary geographically.

- The existing program is in a crisis/response mode. There are numerous government agencies with erosion programs. However, there is no one program to comprehensively address erosion on a statewide basis, to define the scope of the problem, to do a risk assessment and to set priorities for data collection, evaluation and project selection. There is no predictable money source.

Because of this fragmentation, it is not clear who has responsibility for planning, land use, construction or money.

- On undeveloped lands, land use decisions can prevent future problems through set-backs and zoning. On developed lands, should endangered structures be protected or abandoned? Are there sufficient public benefits from protection projects to spend public money to protect private property?

- What time scale should be used for land use and project decisions? How long will solutions last? How should immediate crises be resolved? What are interim solutions?

The panelists agreed on several recommendations for future action including:

- A statewide erosion plan is needed. Problems will never be addressed on a rational, effective, programatic basis until there is a comprehensive statewide plan.

- State level institutional improvements are needed. The existing, fragmented and weak erosion control programs must be brought together in a strong single focus, preferably managed by a single agency.

- Money is needed. The existing programs are insufficiently funded to carry out the panel's recommendations. A steady, predictable source of funding is needed for data collection, studies, plans and projects. Panelists' suggestions included a one mil tax on coastal county hotel receipts, a tax on energy revenue, a bond measure and a line item in the state budget for shoreline erosion control.

- Existing opportunities should be used. The Corps of Engineers' Coast of California Study can be used to collect data, document change and develop "tools" for decision makers. This Coast of California Study should be expanded to include other areas in addition to the present work in San Diego County. Academic institutions can provide information, innovation and low cost ways to collect needed data.

- The San Diego Council of Governments formed a technical task force to write a report on the physical, institutional and funding problems which was used to unify previously fragmented efforts to lobby for state and federal government participation. The San Diego study can be used as a model for other joint political and scientific efforts to address critical erosion problems.

- Studies musts be regional in scope. The "big picture" must be taken into account before "localized" problems can be properly evaluated. Site specific studies to collect information on local conditions (e.g., geology) must be conducted.

- Effects of structural solutions must be evaluated. Structural solutions can work well without significant offsite effects, but sometimes the effects can be substantial. The effect on sand sources, longshore transport, and access must be studied.

- Disagreement exists on the effects of sea level rise. Although sea level rise from melting polar ice cap is thought by some to be a significiant cause of erosion, many disagree. Further analysis of this issue is needed.

- Data already exists but is hard to use. The existing, fragmentary erosion program has produced a vast body of information that is inaccessible and unusable to all but the most hardy.

MANAGEMENT TOOLS: RESEARCH, CONFLICT RESOLUTION, NEW APPROACHES

The major problem of ocean management is equitable resolution of increasing conflicts over the demand for limited ocean resources. Managing a fair allocation process and the use of new methods or tools for management assistance were the subjects of this panel.

The panelists addressed the following issues and areas of concern:

- The traditional view of ocean resources use and management has been based on a "freedom of the seas" doctrine. As the numbers of users and the conflicting uses in the world's oceans have increased, scarcity and competition developed. Therefore, one user's right often interferes with another's right. Moreover, with the industrialized nations' powerful tools of science and technology, damaging impacts can occur which will have long-run and perhaps irreversible effects.

- "Multiple Use" is a management concept that allows several different users to harvest resources, usually without exclusive rights. While multiple use of the world's oceans as a general approach is sound and necessary, it may not be appropriate in some areas. Unique and very important areas must be preserved for research, education, breeding areas.

- A wide variety of data is collected in the marine environment annually. However, only a small amount of the information is actually useful in the decision making process. A specific marine resource management problem must be clearly defined before the demand for more data is made. Once the problem is clearly defined, the management agency must determine if the question can be answered with new data or if the solution is one of striking a compromise between opposing uses and associated benefits. Also, the difficulty of data collection in the marine environment must be acknowledged. The ocean is an extremely changeable environment, with continuous seasonal and spatial fluctuations. The state and federal government need to work with the scientific community and the various user groups to establish a network of data sharing. This will require the condensation of scientific studies to information easily assilimated in the decision making process.

- There is a strong push to make resource management decisions on a cost-benefit basis today. It is very difficult to assign monetary values to non-consumable resources.

- Visual considerations have often been overlooked in the design of marine facilities.

The following are the major conflicts and some suggestions for their resolution made by the panel:

- The State of California needs to develop a sound marine resource management policy which establishes a general framework for all involved agencies.

- Any comprehensive marine resource management plan for California should include a clear identification of the resources, the users and the potential conflicts. Also, techniques for conflict resolution should be an important component of such a plan. Panelists suggested the possible use of third party intervenors and required training in conflict management for those working in controversial marine resource management positions.

- A program of cooperation between research institutions should be established to set priorities for research to avoid duplicity and assure that the most critical issues receive scientific attention.

- There must be long-term support for data collection and analysis focused on specific resource management issues. Agencies must establish data systems or a central inventory of existing data banks so that information can be exchanged efficiently and duplication of effort minimized.

- The State of California should consider the question of establishing economic values on non-market resources. In cases where it could be utilitzed, standard approaches must be determined.

- In addition to the diverse mandates of involved state and federal agencies, there is the ongoing problem of communication and coordination. Local governments, who have little direct responsibility for marine resource management, often are entirely excluded from the decision making processes.

- A critical issue that must be considered is the relationship between different marine resources (i.e. fishery stocks and marine mammal population). It is also important that any marine policy consider the land/sea interface...the relationship activities on the land and in the sea have to one another.

Section III

RECOMMENDATIONS

During the Symposium's presentations on the variety and diversity of marine resources technical and management issues facing California's decision-makers, several subjects, ideas or themes came up repeatedly. These crossed the spectrum of living and nonliving, renewable and non-renewable resource issues and management concerns and were discussed by most panels. During the core group deliberations, these themes were further discussed and refined into the following:

- The ocean must be recognized as a "commons", an area where traditional land use management concepts are generally less applicable.

- The "wet" and the "dry" sides of the coastal zone must be viewed as a whole, as a unit, in both planning and management of the area.

- The interrelationships between the various marine resources and their respective uses must be clearly identified and respected in any management program.

- The vested rights of long-term user groups must be recognized in the management processes while the importance of orderly and equitable distribution of the benefits of the resources is stressed.

- All use and mangement practices must include restoration and enchancement to ensure long-term productivity and continuation of the resource for future generations.

- Public participation is vital to effective management process; educate the public on the importance of ocean resources and then enlist their participation in the early stages of marine policy making and conflict resolution. For effective participation, the public must have access to the full range of "facts" if they are to contribute to problem resolution rather than becoming inflexible constituents.

- Encourage a strong public/private partnership for appropriate marine projects; perhaps designate a state agency to serve as a link with industry to seek early solutions to potential problems.

- Strengthen the communication systems between the myriad of state and federal agencies with jurisdiction over California's marine resources and their various constituency groups.

- To be successful with such an array of agencies and user groups, there must be methods and procedures for conflict resolution included in any comprehensive management plan developed by the State.

- Data needs must be clearly defined: Is more research required or only an improved network of data sharing? Establish a central inventory of existing data banks, a clearinghouse for the exchange of information, to avoid agency duplication of effort.

In addition to these common themes, the core group produced some specific suggestions for future consideration. The group stopped short of taking any policy positions or recommending a specific action for a state agency or the legislature. Each of the 30 members of the core group acted as individuals, not as official representatives of

their organizations; and, as individuals, not all members of the group agreed with the statements or conclusions reported here.

In several areas, the group recommended that a state policy should be determined so unified positions could be taken on upcoming issues and potential conflicts. One such area was the proposed extension of coastal jurisdiction from three to twelve miles and the potential use of OCS revenue share funds for increased state management responsibility in the expanded area. It was also suggested that the State should take a position on assuming responsibility, again with OCS revenue sharing, if a 200-mile exclusive economic zone is established. Another area the group recommended policy determination was, when feasbile and mutually-agreed-upon, in decentralizing regulation and implementation of some marine resources management responsibilities by transferring responsibility for carrying out specific projects to locally-based organizations. No details for delegating such responsibility were discussed. The core group suggested policy be made in the near term about radioactive waste dumping offshore California. They also recommended developing a statewide coastal erosion plan which would focus on reconstruction after disasters and reevaluating water quality standards in light of aquaculture, fish and wildlife resources and waste dumping.

The core group discussed the most effective institutional arrangements for federal, state and local government interaction. This included the need for establishing a cooperative program between research organizations and state management agencies to set research priorities so that issues most critical for management decisions would receive priority for research efforts; working closely with industry, the scientific community and the various user groups to establish data sharing networks to better exchange information and reduce duplication of effort; and establishing some type of inventory of data banks or a clearinghouse to better disseminate information. It was stated that without long-term policy and financial support from state and federal government there cannot be a very effective, all-inclusive data collection and analysis process for marine resources; piecemeal data collection will not provide the accurate information necessary for decision-makers.

The group suggested that techniques and mechanisms for conflict resolution be included in future marine resource management plans to reduce controversy and acrimony between the various constituency groups.

In each subject area discussed by a panel during the Symposium, the core group made some suggestions—ideas that should be adopted in policy planning or some specific action that could be undertaken by a state agency. These are presented as discussed by the core group.

AQUACULTURE

Aquaculture facility siting decisions should be based on merit and contribution, compatible with other uses of the area, and with full recognition of its coastal dependent status. A flexible approach to zoning should be adopted to make available for aquaculture uses the broadest range of compatible zones. Discharge regulations and open ocean frontage needs should be reevaluated for the aquaculture industry.

COMMERCIAL AND SPORT FISHERIES

The establishment of a California Fishery Management Council which would shift management of California fisheries back to the State from the Pacific Northwest Fisheries Management Council was suggested. The conflicts between fisheries and marine mammals and fisheries and seismic vessels were recognized. The questions of salmon ranching and genetic factors and the "sole ownership of fisheries" were discussed with no resolution. The core group suggested that close coordination between the Department of Fish and Game and the Coastal Commission should continue. This coordination has helped achieve sensitive, long-range land use planning beneficial to fish and wildlife resources in the coastal zone and should help achieve similar objectives in the marine environment. The group suggested that policy be developed to actively protect the commercial fishing industry and that water quality controls be reevaluated for fish and wildlife needs.

MARINE MAMMALS

Because of present jurisdictional conflicts over marine mammal issues, the group suggested a single state agency may be best suited for coordination and integration. Institutional researchers and state and federal funding agencies should be encouraged to undertake well-planned studies of the dynamics of mammal interaction with the marine ecosystem. A strong state effort will be required to sort out the increasing mammal/fisheries conflicts since single-interest constituencies are becoming more polarized. There are parallels in land-based game management that could be effective in this effort.

MARINE SANCTUARIES, REFUGES AND UNDERWATER PARKS

The numerous types and nomenclature of sancturaries, underwater parks and refuges are confusing and often result in having the limited funding and protective efforts available spread too thin to effectively protect the resource. The needs for preservation and protection should be sorted out with an hierarchy of importance established. Some areas should be set aside permanently for research only.

OFFSHORE ENERGY AND MINERAL ACTIVITIES

Offshore oil production and transportation was recognized as a most significant issue but was not discussed in detail by the core group because of time constraints. The

group did suggest that policy guidelines should be developed to address ocean mining waste disposal, siting of processing facilites and the potential economic benefits and risks to the State.

MARINE POLLUTION

The State should develop an active position on nuclear and toxic waste disposal in the nearshore ocean immediately. State and local health agencies should be involved in all marine pollution issues at the earliest stages.

MARINE TRANSPORTATION

While the core group conceded that marine shipping often conflicts with other ocean uses, it is necessary and important to the economic health of the State. The suggestion was made that mandatory traffic control systems be established in the near future along the California coast and in harbors where major conflict potential exists.

SHORELINE EROSION

A statewide policy on erosion control and management is needed. It was suggested the U.S. Army Corps of Engineers' erosion study of the coast of California be expanded to include other areas in addition to the present effort in San Diego County. A new state plan should focus on reconstruction after disaster, beach by beach, with efforts tied to funding available and collection of necessary data.

Conclusion

The Ocean Studies Symposium was the first step in a continuing process of looking at the use and management of California's marine resources. The initial phase — the project and conference, sponsored by the Coastal Commission, Department of Fish and Game, San Francisco Planning and Urban Research Association, and the William H. Donner Foundation — ends with publication of this report.

The second step could be the development of a framework for a comprehensive state marine resources management program. Symposium participants suggested that a good way to do this would be for the State Legislature or an assigned agency to evaluate the ideas generated at the Symposium.

In the State Assembly a resolution, "Assembly Concurrent Resolution No. 15 — Relative to Ocean Resources," was introduced by Assemblymen Sam Farr, Willie Brown, Gerald Felando, William Filante, Dan Hauser, Tom Hayden, Robert Naylor, Jack O'Connell and Steve Peace on December 27, 1982, and amended on January 26, 1983. This resolution would "direct the Joint Committee on Fisheries and Aquaculture to evaluate an ocean studies symposium report prepared by the California Coastal Commission and the Department of Fish and Game, to hold a hearing in the spring of 1983 on marine resource management, and to submit an action plan on marine resource management to the Legislature by October 1, 1983, with assistance from the Assembly Office of Research and the Senate Office of Research." The full text of the resolution is included in Appendix D.

With such legislative interest and support, the second step in California's ongoing effort to look at its future role in marine resources management is well underway.

Appendix A

HISTORY OF OCEAN STUDIES PROJECT AND SYMPOSIUM

WILLIAM H. DONNER FOUNDATION GRANT

On January 21, 1982, Michael L. Fischer, Executive Director of the California Coastal Commission, submitted a proposal to the William H. Donner Foundation of New York. The proposal requested $55,000 to "provide the time, expertise and financial support to thoughtfully, carefully think through the specific steps the Coastal Commission should take in approaching its future role in marine resources." The proposal called for assessing current needs, such as data collection, increased regulatory responsibility, coordination of existing agencies' efforts, and for clearly defining some next actions for the Commission, such as staff expertise, size and allocation, new research or data management efforts.

The Donner Foundation awarded the grant in early March to the San Francisco Planning and Urban Research Association (SPUR), a non-profit organization which would administer the grant funds for the Coastal Commission. A project director, Virginia Lyle, a private consultant formerly with the U.S. Department of the Interior, was hired, and the program was underway by April 1, 1982. Susan Hansch, the Coastal Commission's marine resource analyst, was assigned to provide technical assistance and program advice as needed in the project.

As preliminary planning progressed, the scope of the project broadened; instead of looking only at the Coastal Commission and its future role, the grant would be used for a project involving all state agencies concerned with marine resources management. The project would look at the State's future role in marine resources management and see if solutions to current conflicts or clear directions for future action would evolve. As the agency primarily responsible for the management and protection of the State's living marine resources, the Department of Fish and Game was invited to play a significant role in the study project and to co-sponsor the symposium.

The project was developed in three phases: a solicitation of policy papers on a range of marine resource issues with primary focus on management concerns; a symposium to bring together principals from the various government, industry, academic and environmental organizations to discuss common concerns, share ideas about new technology, management issues and discuss options for the future; and a report containing the policy papers, symposium proceedings and recommendations for policy changes and/or administrative actions which would go to the Governor, the State Legislature, the Coastal Commission, state and federal management agencies and the general public.

POLICY PAPERS

A call for policy papers went to over 600 state, local and federal government agencies, members of the state legislature, national scientific research organizations, California's colleges and universities, appropriate industries and environmental organizations. The policy papers were to address the following technical issues, with specific emphasis on management options and solutions: Jurisdiction of the Oceans; Living Marine Resources; Offshore Mineral and Energy Resources and Industrial Activities; Marine Pollution/The Ocean as a Dumping Ground; Marine Transportation; and, Shoreline Erosion. Seventy-six authors were selected from the various disciplines to ensure a balanced response on each issue.

The papers selected for presentation at the symposium covered the spectrum of marine resource management issues. They did not provide in-depth analysis of political issues nor technical data, rather they provided a broad overview of the complex concerns and the variety of issues facing lawmakers, government regulatory agencies, industry, and public research institutions.

OCEAN STUDIES SYMPOSIUM

A Symposium was held to provide a forum for the exchange of ideas and information and to allow representatives of the various disciplines involved in marine resources to look at and discuss the broad spectrum of issues rather than focus on their own technical specialities.

The Ocean Studies Symposium, held November 7-10, 1982, at the Asilomar Conference Center in Pacific Grove, CA, was designed to allow intense information exchange and informal discussion among the approximately 250 attendees. There were two days of technical presentations with sessions consisting of a panel with speakers limited to five minutes for individual presentations, followed by a question and answer period for audience participation.

The Symposium was structured in this manner to allow for maximum information exchange in a very limited time, to eliminate concurrent sessions, and to provide as much audience-speaker interaction as possible. The range of information presented painted a vivid picture of the complexity of marine resource management concerns in California.

The Symposium began with an overview of state agency roles and responsibilities in marine resources management. This allowed participants to gain perspective on the fragmentation of the state's regulatory and management responsibilities and to clearly understand current policies and practices. Following the state overview, there were technical panels on: Law of the Sea/The National Role in Ocean Management; Aquaculture; Commercial and Sport Fisheries; Marine Mammals; Marine Sanctuaries, Underwater Parks and Refuges; Offshore Energy and Mineral Resources and Industrial Activities; Marine Transportation; Marine Pollution; Shoreline Erosion; Management Tools: Research, Conflict Resolution, New Approaches for Managers; and, The State/Local Government Role.

William J. Whalen, Executive Director of the San Francisco Planning and Urban Research Association, was the chairman of the Ocean Studies Symposium. His skillful handling of the overflow audience and the long, intense sessions kept the Symposium on course. David Sibbet of Sibbet and Associates, was selected to facilitate the symposium. Mr. Sibbet made wall-sized graphic charts of each speaker's presentation; these charts were in audience view and were available for reference during the panel presentatons. These visual aids helped focus and refine the presentations as well as allowed participants to refresh their memory as the sessions continued.

Dr. Frank H. Talbot, Executive Director, California Academy of Sciences, was selected to serve as chairmen of a group of panel moderators. Eleven panel moderators were chosen to guide the presentations of their panels and to summarize the various presentations for review by the core group. The panel moderators attended a training session before the Symposium to meet each other, Dr. Talbot and Mr. Whalen and to be introduced to David Sibbet and his work methods and learn how to best use Mr. Sibbet to aid their panel's work. The panel moderator and panelists are listed in Appendix B with reproductions of Mr. Sibbet's graphics.

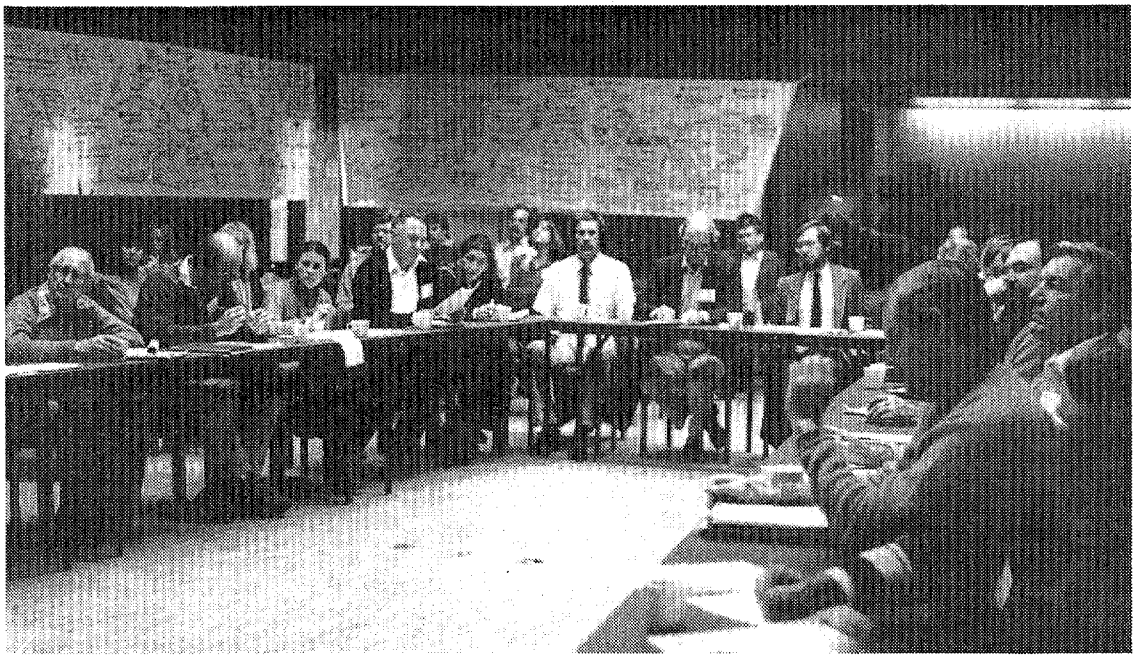
Mr. Whalen, Mr. Sibbet and Dr. Talbot as well as Coastal Commission and Department of Fish and Game staffers were included in the early stages of the Symposium planning to allow them clearer understanding of the purposes and aims of the project and to draw upon their experience for program improvements.

CORE GROUP

In order to facilitate discussion about future management options, a small group of senior level officials representing all the disciplines involved in marine resources was invited to serve as a "core group." The "core group" would be limited in size to allow easy information exchange and idea sharing. Thr group consisted of 30 members selected for their interest and knowledge of California's coastal resources and marine management concerns and as representatives of organizations managing or using the resources. A list of members of the core group is included in the appendices.

Prior to the Symposium, core group members received copies of policy paper abstracts for review. They attended a briefing/training session the day before the Symposium to prepare them for their role during the conference. The core group listened to and participated in the technical sessions. They met for four hours the final day of the Symposium to determine what action should be taken next. The group reviewed panel summaries, then discussed goals, priorities and recommendations for future action. These recommendations are discussed in the opening sections of this report.

Those serving on the core group served as individuals, not as official representatives of their organizations, nor did they necessarily agree with all comments made by the core group.

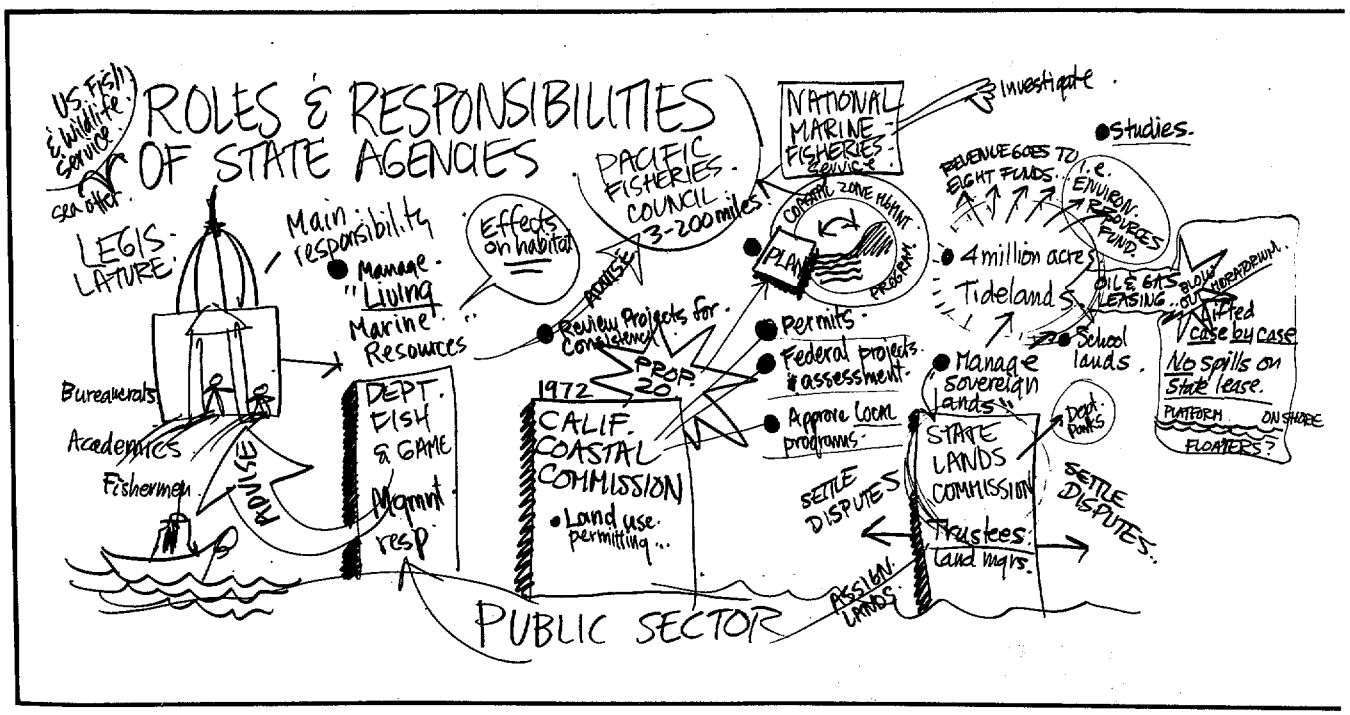


Members of Core Group listening to Panel Moderators' summary reports.

Appendix B

CONFERENCE PANELS AND GRAPHICS

Naomi Schwartz, Chairwoman of the California Coastal Commission, welcomes Symposium participants at opening session.

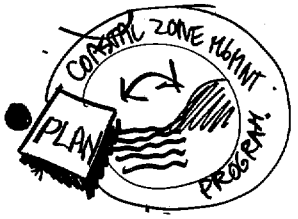


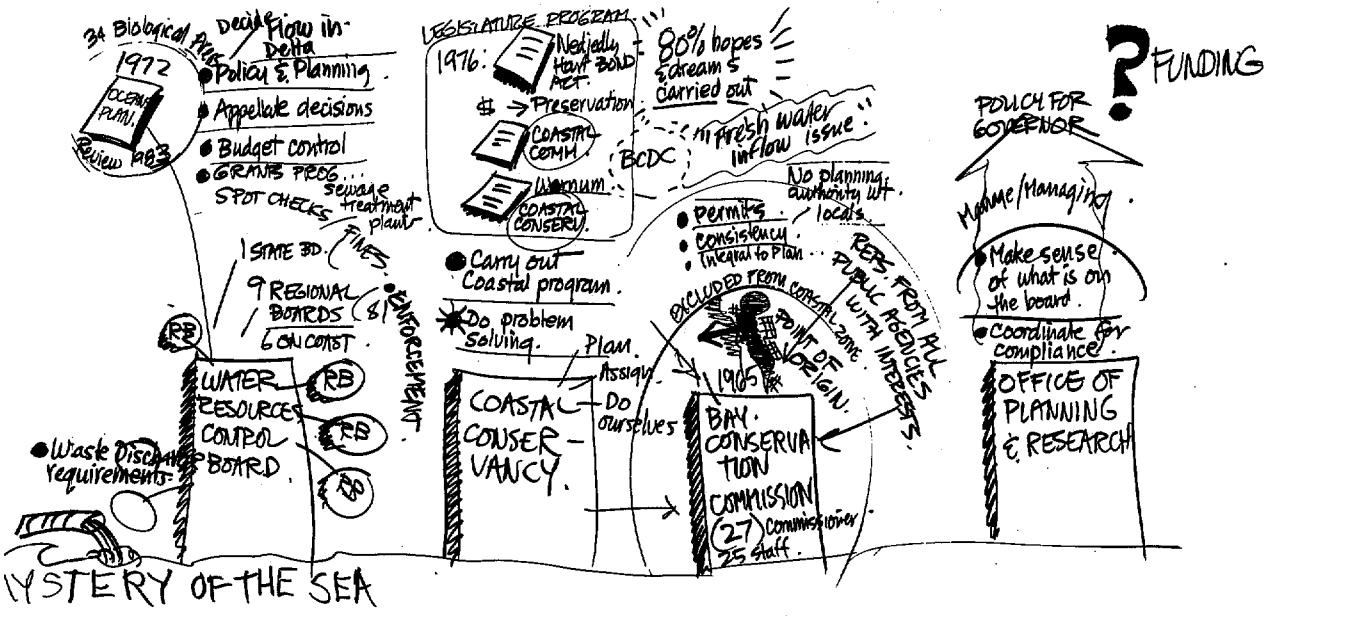
ROLES AND RESPONSIBILITIES OF STATE AGENCIES IN MARINE RESOURCE MANAGEMENT

Department of Fish and Game - E. C. Fullerton

California Coastal Commission - Naomi Schwartz, and Mel Nutter, California Coastal Commission

State Lands Commission - Claire Dedrick



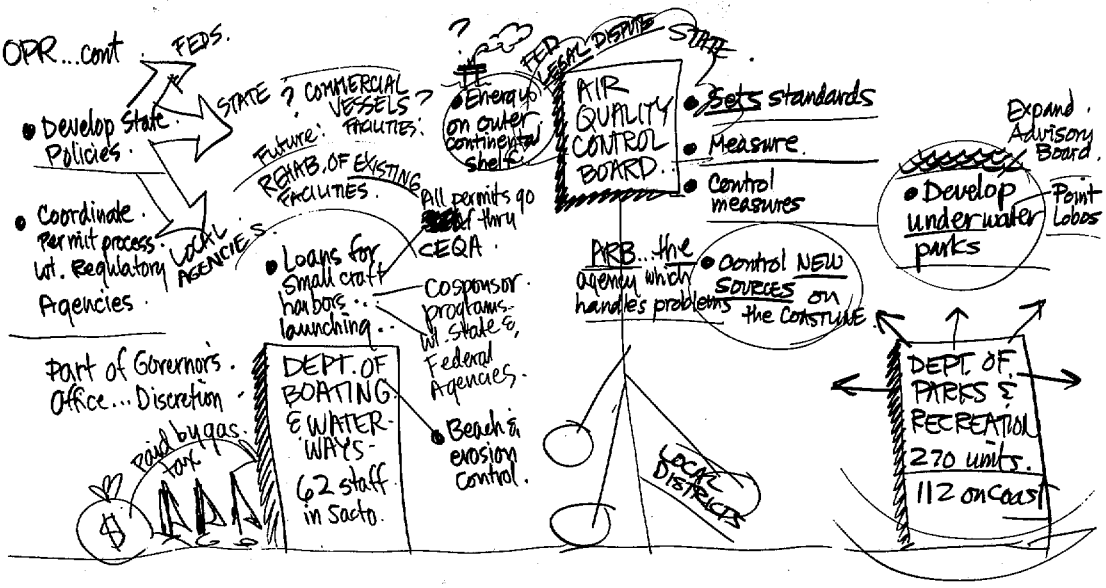


Water Resources Control Board - Carole Onorato

Coastal Conservancy - Joseph Petrillo

San Francsico Bay Conservation and Development Commission - Michael B. Wilmar

Office of Planning and Research - Deni Greene

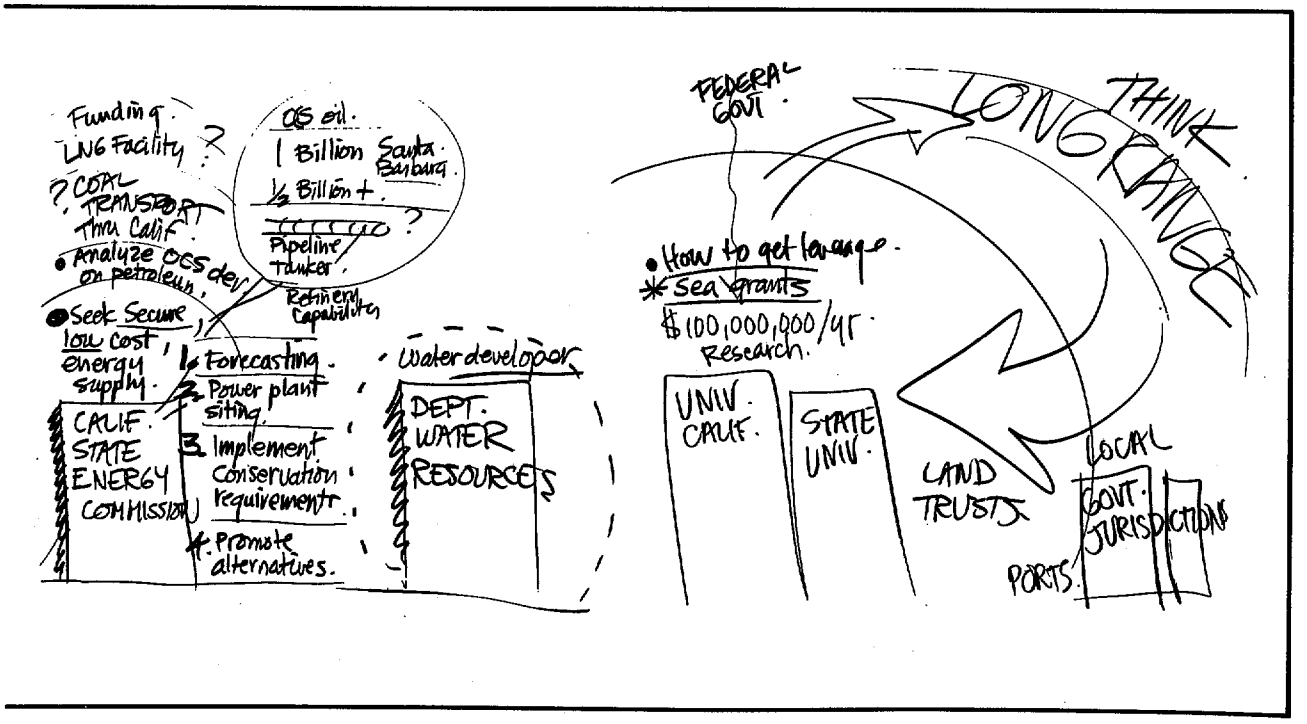


ROLES AND RESPONSIBILITIES OF STATE AGENCIES IN MARINE RESOURCE MANAGEMENT (cont'd)

Department of Boating and Waterways - Marty Mercado

Air Quality Control Board - Gary Patton

Department of Parks and Recreation - Rod Tuttle



California Energy Commission - Michael E. Shapiro

LAW OF THE SEA/NATIONAL ROLE IN OCEAN MANAGEMENT

Moderator: John Temple Swing
Council on Foreign Relations
New York, NY

Panelists: Ronald S. Katz
Gaston Snow & Ely Bartlett, Palo Alto, CA

Terry L. Leitzell
Bogle & Gates, Washington, DC

Eldon V. C. Greenberg
Galloway and Greenberg, Washington, DC

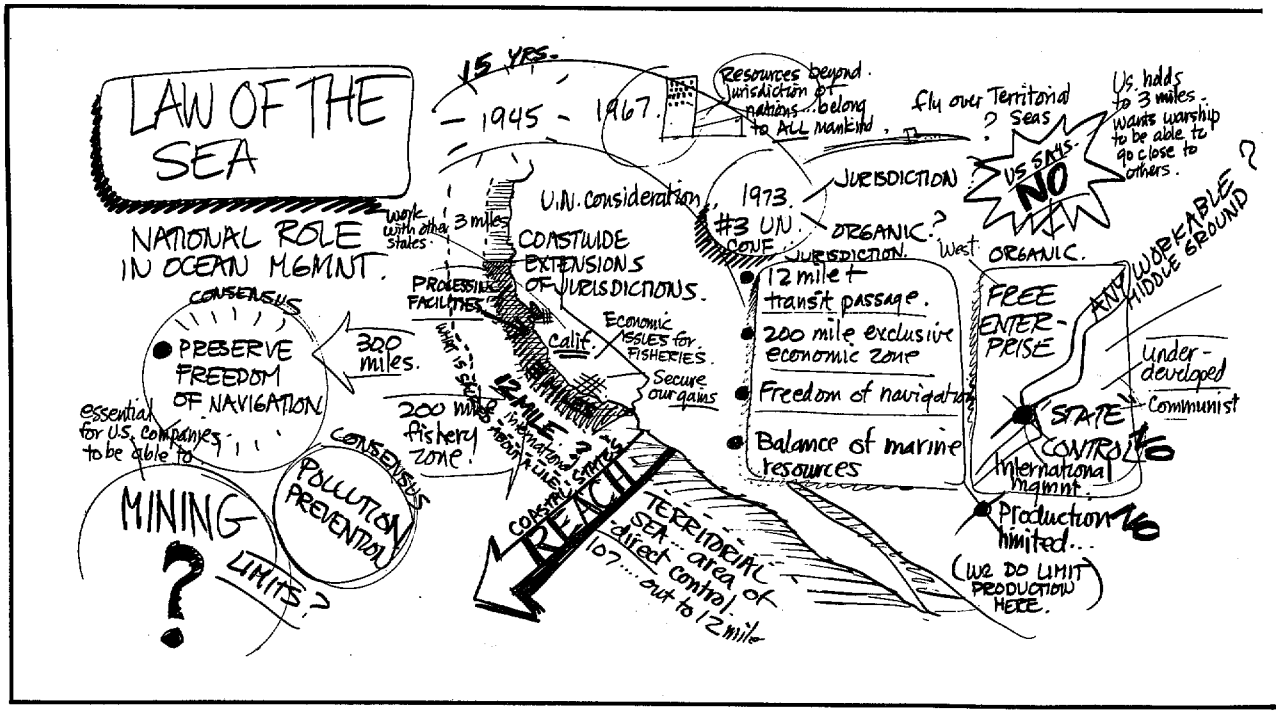
Robert W. Knecht
Woods Hole Oceanographic Institution, Woods Hole, MA

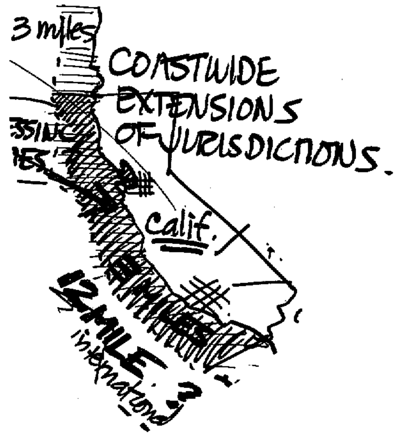
William E. Westermeyer
Woods Hole Oceanographic Institution, Woods Hole, MA

Michael E. Shapiro
California Energy Commission, Sacramento, CA

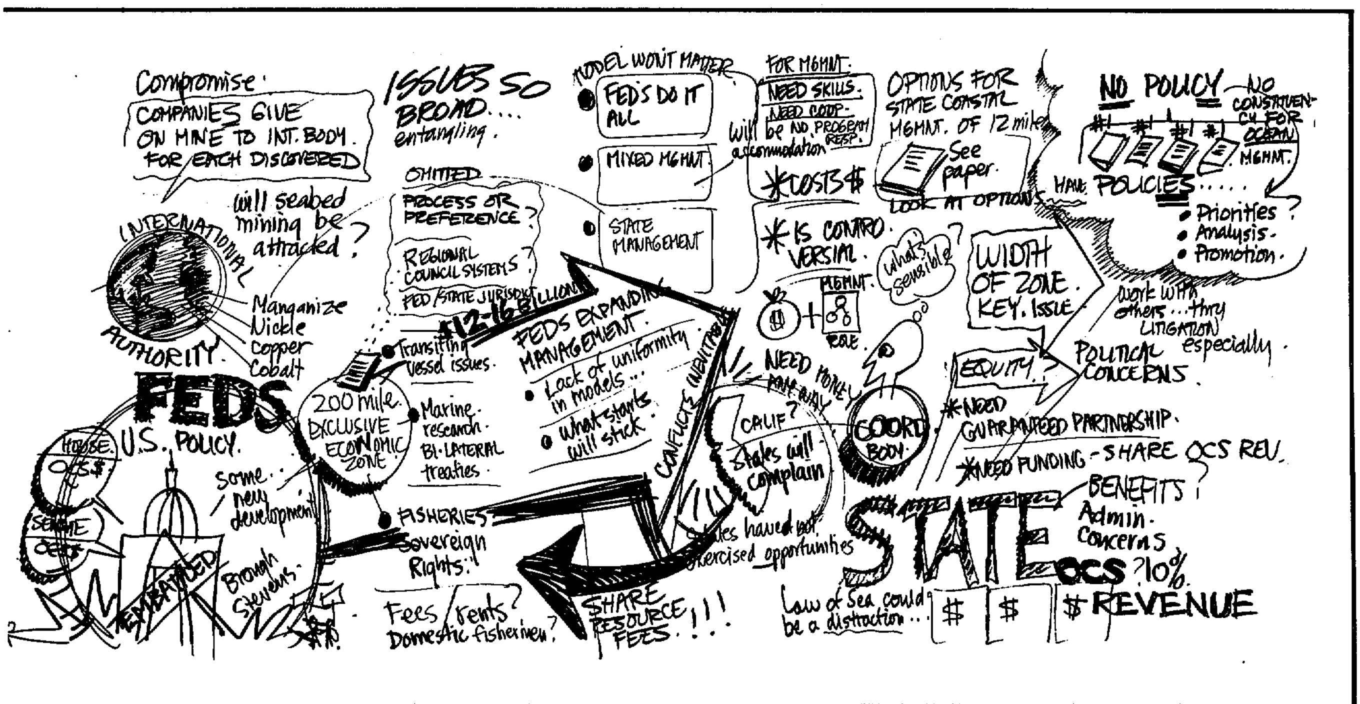
Rosella W. Shapiro
Governor's Office of Planning and Research, Sacramento, CA

Samuel A. Bleicher
Blank, Rome, Comiksy, McCauley, Washington, DC




3 miles
COASTWIDE EXTENSIONS OF JURISDICTIONS.
calif.
12 MILE
international


INTERNATIONAL AUTHORITY.


Compromise.
COMPANIES GIVE ON MINE TO INT. BODY. FOR EACH DISCOVERED
will seabed mining be attracted?
INTERNATIONAL AUTHORITY.
Manganize
Nickle
Copper
Cobalt
ISSUES SO BROAD.... entangling.
OMITTED
PROCESS OR PREFERENCE?
REGIONAL COUNCIL SYSTEMS?
FED/STATE JURISDICTION
$12-16 BILLION
MODEL WONT MATTER.
FED'S DO IT ALL
MIXED MGMNT.
STATE MANAGEMENT
Will be accommodation
FOR MGMNT.
NEED SKILLS.
NEED COOP.
NO PROGRAM RESP.
*COSTS$
*IS CONTROVERSIAL.
MGMNT.
ROLE.
what's sensible?
OPTIONS FOR STATE COASTAL MGMNT. OF 12 mile
See paper.
LOOK AT OPTIONS
NO POLICY — NO CONSTITUENCY FOR OCEAN MGMNT.
#1 #1 #1 #1
HAVE POLICIES.....
• Priorities?
• Analysis.
• Promotion.
WIDTH OF ZONE. KEY. ISSUE.
work with others... thru LITIGATION especially.
POLITICAL CONCERNS.
EQUITY?
FEDS
U.S. POLICY.
HOUSE OCS$
SENATE OCS
some new development
Brough Stevens.
EXPANDED
200 mile. EXCLUSIVE ECONOMIC ZONE
Transiting vessel issues.
Marine research.
BI-LATERAL treaties.
FISHERIES Sovereign Rights.
Fees/rents? Domestic fishermen?
FEDS EXPANDING MANAGEMENT.
• Lack of uniformity in models...
• what starts will stick.
CONFLICTS INEVITABLE
SHARE RESOURCE FEES. !!!
NEED MONEY ANY WAY
CALIF?
States will complain
States have not exercised opportunities
COORD. BODY.
*NEED GUARANTEED PARTNERSHIP.
*NEED FUNDING - SHARE OCS REV.
BENEFITS?
Admin. Concerns
STATE
OCS ?10%
Law of Sea could be a distraction...
$ $ $ REVENUE

AQUACULTURE

Moderator: Dr. Fred S. Conte
University of California, Davis, CA

Panelists: Dr. Judith E. Hansen
Marine Bioassay Laboratory, Watsonville, CA

Dr. John L. Dupuy
West Coast Aquaculture Foundation, Monterey, CA

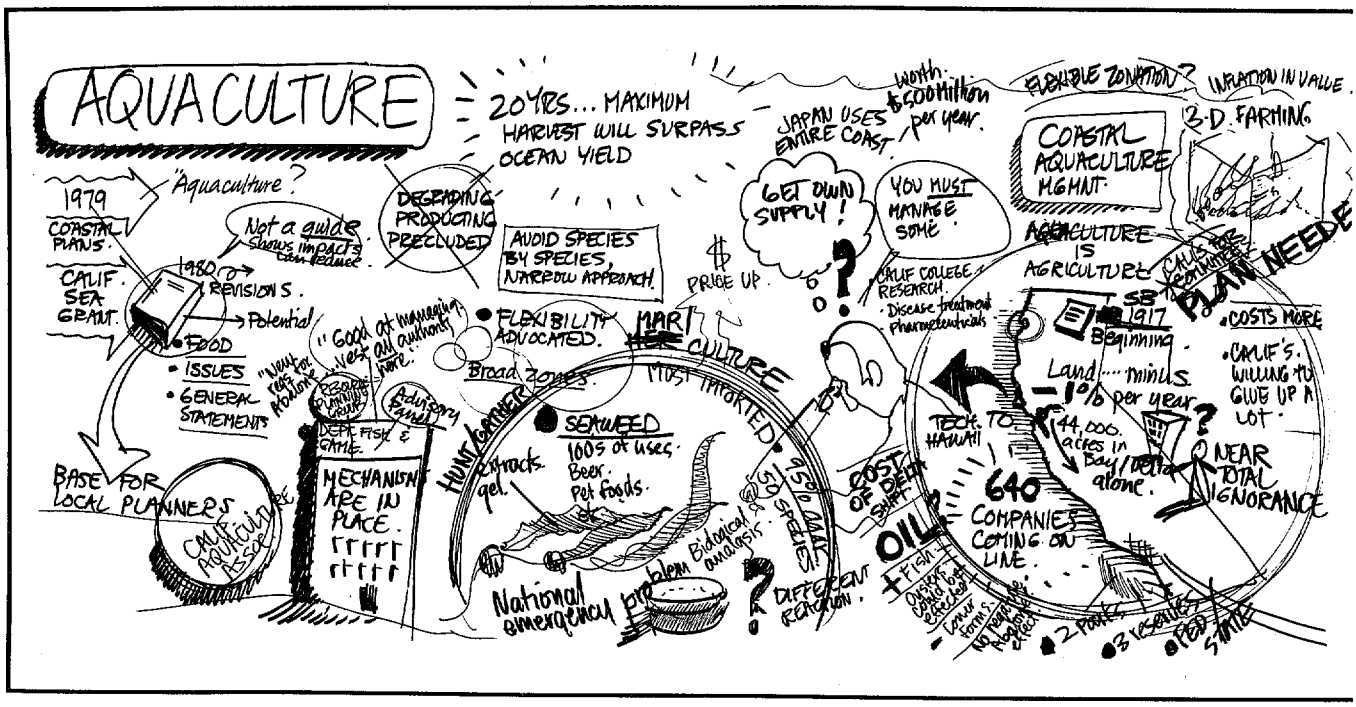
Dr. William N. Shaw
Telonicher Marine Laboratory, Humboldt State University

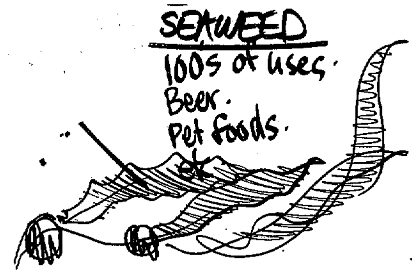
Donald E. Conner
KELCO Division of Merck & Company, San Diego, CA

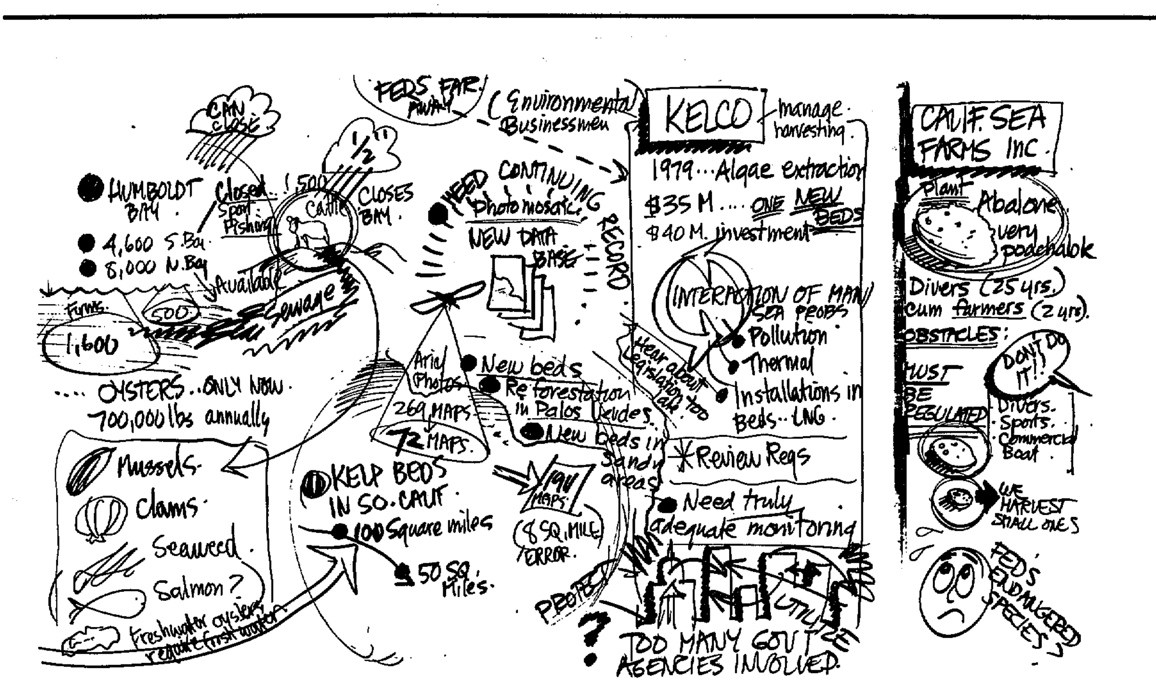
Ronald H. McPeak
KELCO Division of Merck & Company, San Diego, CA

Michael Neushul
Neushul Mariculture, Goleta, CA

Lad Handelman
California Sea Farms, Inc., Santa Barbara, CA




SEAWEED
100s of uses.
Beer.
Pet foods.


CAN CLOSE
HUMBOLDT BAY
Closed Sport Fishing
500 Cattle
CLOSES BAY.
4,600 S. Bay
8,000 N. Bay
Available
Sewage
Farms.
500
1,600
.... OYSTERS.. ONLY NOW.
700,000 lbs annually
Mussels.
clams.
Seaweed.
Salmon?
Freshwater oysters require fresh water.
FEDS FAR AWAY
(Environmental Businessmen
NEED CONTINUING RECORD
Photo mosaic.
NEW DATA BASE
Arial Photos
269 MAPS
72 MAPS.
New beds
Reforestation in Palos Verdes
New beds in sandy areas
KELP BEDS IN SO. CALIF.
100 Square miles
50 SQ. Miles.
190 MAPS.
(8 SQ. MILE ERROR.
PROBE
KELCO
manage harvesting
1979... Algae extraction
$35 M.... ONE NEW BEDS
$40 M. investment
INTERACTION OF MAN SEA PROBS
Pollution
Thermal
Installations in Beds.. LNG.
Hear about legislation too late
Review Regs
Need truly adequate monitoring
TOO MANY GOV'T AGENCIES INVOLVED
CALIF. SEA FARMS INC.
Plant
Abalone
very podchalok
Divers (25 yrs.)
cum farmers (2 yrs).
OBSTACLES:
MUST BE REGULATED
DON'T DO IT!
Divers.
Sports.
Commercial Boat
WE HARVEST SMALL ONES
FED'S ENDANGERED SPECIES?

COMMERCIAL AND SPORT FISHERIES PANEL

Moderator: Dr. Elizabeth L. Venrick
Scripps Institution of Oceanography
La Jolla, CA

Panelists: Dr. David Hankin
Humboldt State University, Arcata, CA

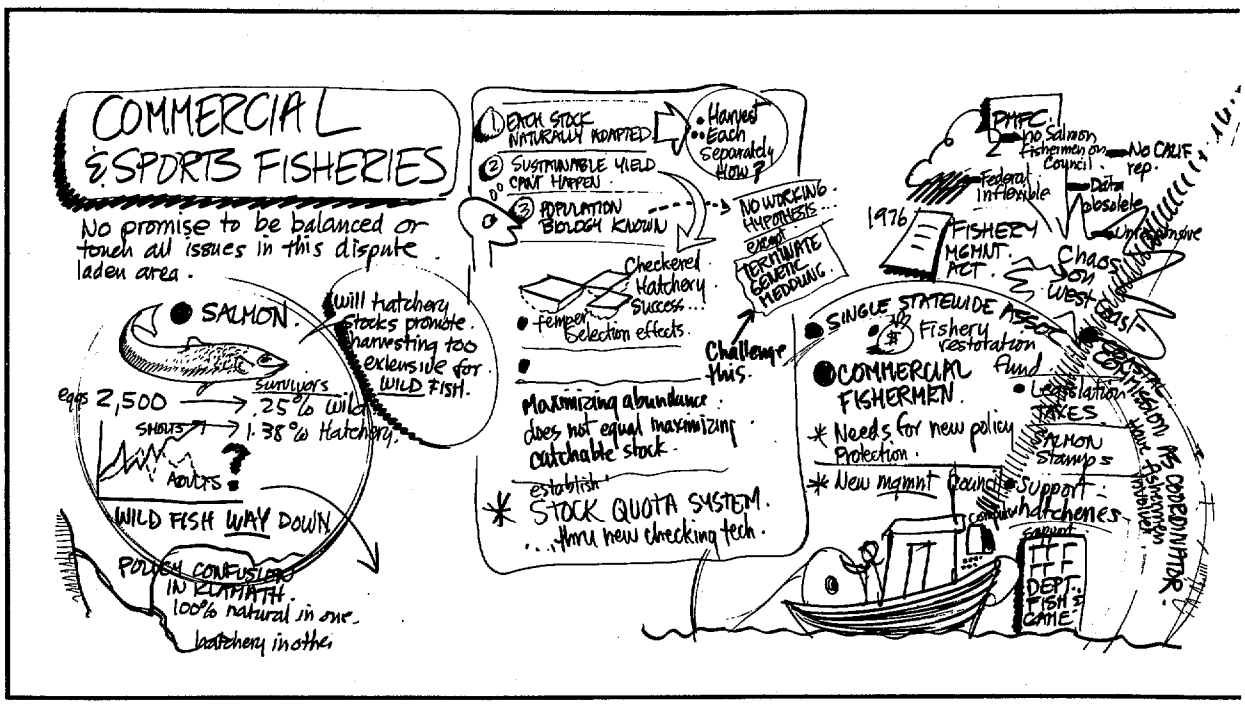
Dr. Graham A. E. Gall
University of California, Davis, CA

Stephanie R. Thornton
Humboldt Fishermen's Marketing Association, Eureka, CA

Robert R. Abbot
Tiburon Center for Environment Studies, Tiburon, CA

Paul Sund
National Marine Fisheries Service, Tiburon, CA

Thomas L. Wright
Chevron, USA, Concord, CA



Dan Ray
California Coastal Commission, Eureka, CA

Bruce Fodge
California Coastal Commission, Eureka, CA

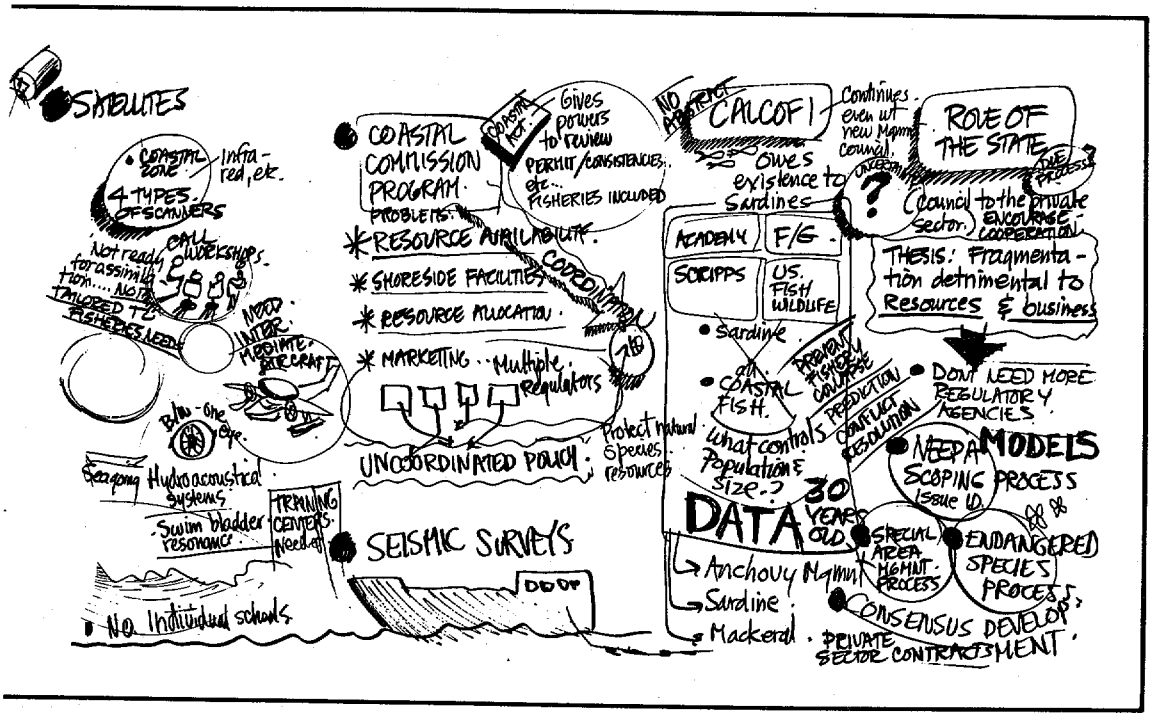
Christopher Toole
Marine Advisory Extension Service, Eureka, CA

Dr. Reuben Lasker
CalCOFI Coordinator, University of California, San Diego, CA

Robert D. Thornton
Nossaman, Krueger & Knox, Costa Mesa, CA

Susan K. Hori
Nossaman, Krueger, Knox, Costa Mesa, CA

Paul Olin
University of California, Davis, CA



MARINE MAMMALS PANEL

Moderator: Dr. Charles D. Woodhouse
Santa Barbara Museum of Natural History
Santa Barbara, CA

Panelists: Dr. Charles F. Cooper
San Diego State University, San Diego, CA

Brent S. Steward
Hubbs/Sea World Research Institute, San Diego, CA

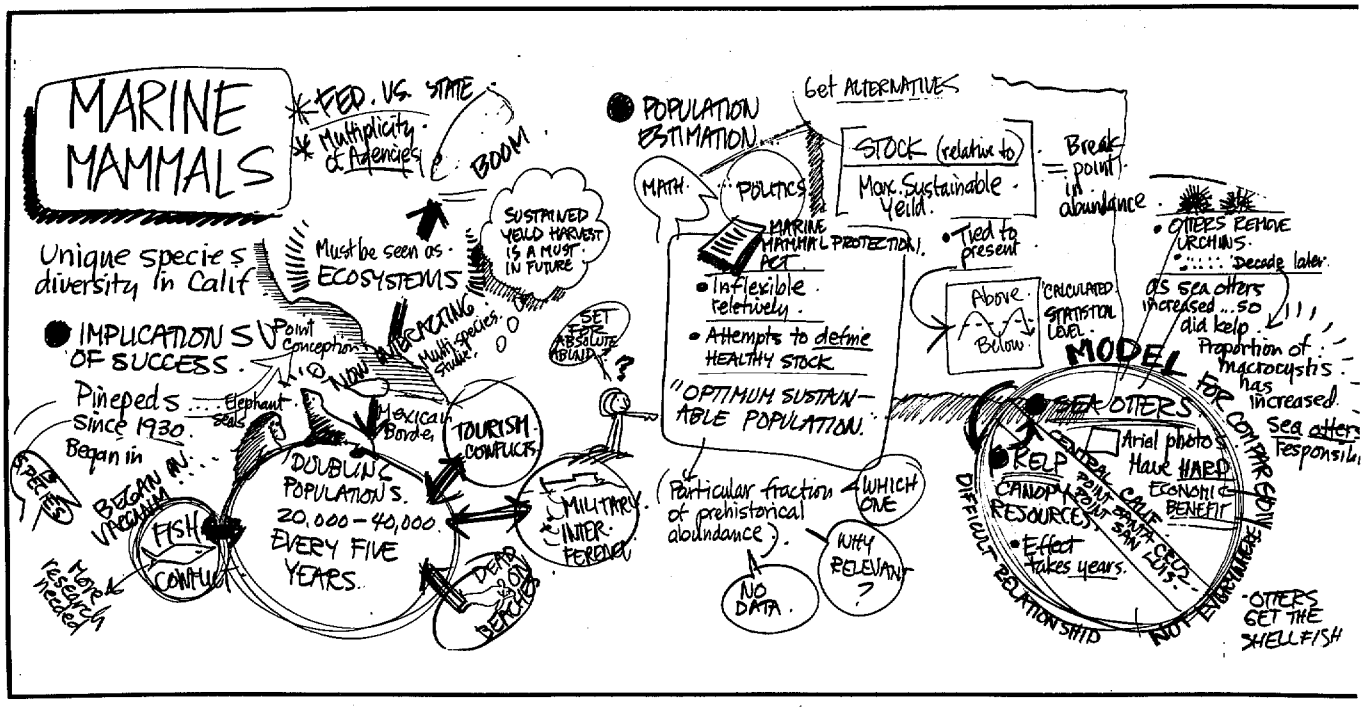
Dr. Daniel Goodman
Scripps Institute, La Jolla, CA

Dr. Glenn R. VanBlaricom
U.S. Fish and Wildlife Service, San Simeon, CA

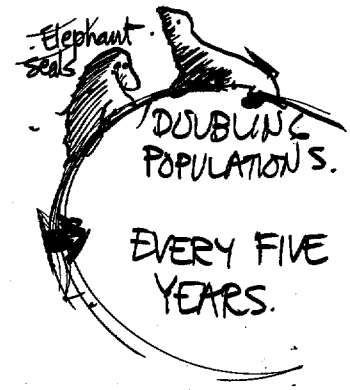
Dr. Leslie A. Dierauf
California Marine Mammal Center, Sausalito, CA

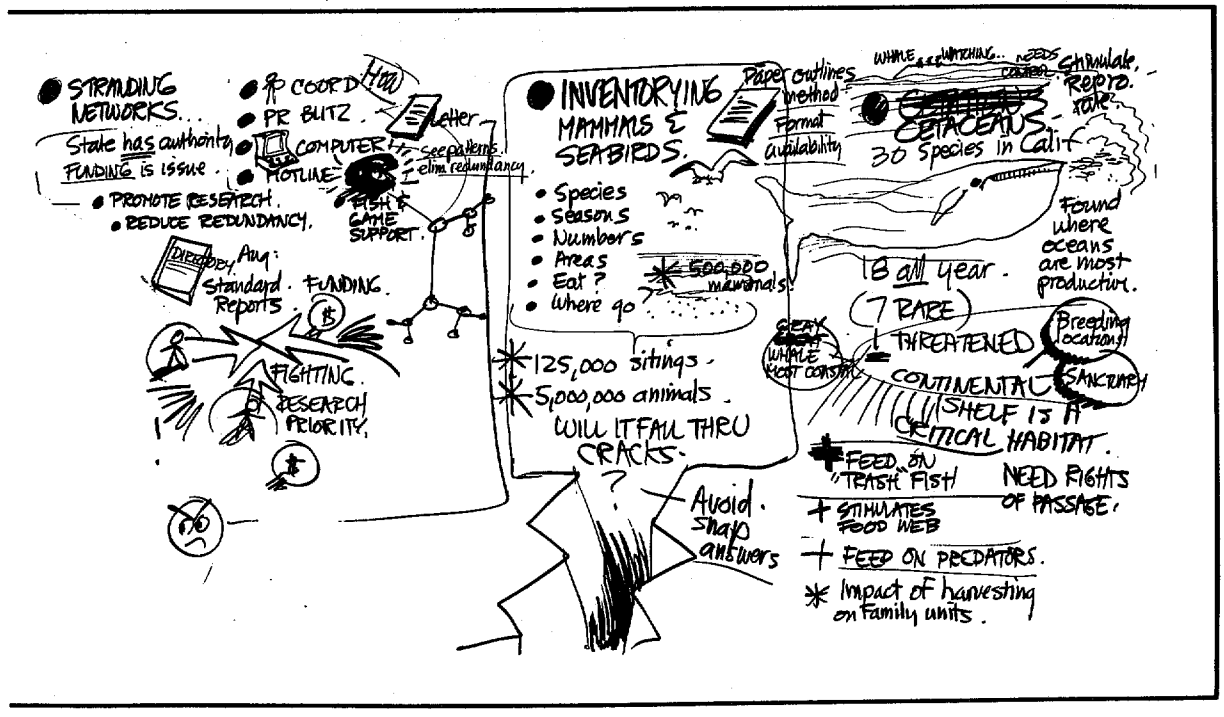
Dr. Thomas P. Dohl
University of California, Santa Cruz, CA

Ronn Storro-Patterson
The Whale Center, Oakland, CA




SET FOR ABSOLUTE ABUND.?


Elephant seals
DOUBLING POPULATIONS.
EVERY FIVE YEARS.


STRANDING NETWORKS...
State has authority
FUNDING is issue.
PROMOTE RESEARCH.
REDUCE REDUNDANCY.
PR COORD
PR BLITZ.
COMPUTER
HOTLINE
Letter
FISH & GAME SUPPORT.
see patterns. elim redundancy.
Any standard Reports.
FUNDING.
FIGHTING.
RESEARCH PRIORITY.
INVENTORYING MAMMALS & SEABIRDS.
Species
Seasons
Numbers
Areas
Eat?
Where go?
500,000 mammals
125,000 sitings.
5,000,000 animals.
WILL IT FALL THRU CRACKS.
?
Avoid. Snap answers
Paper outlines method
Format
Availability
CETACEANS.
30 species in Calif
8 all year.
(7 RARE
1 THREATENED)
GRAY WHALE MOST CONSTANT
CONTINENTAL SHELF IS A CRITICAL HABITAT.
Breeding location?
SANCTUARY
Found where oceans are most productive.
Stimulate. Repro. rate
FEED ON "TRASH" FISH
+ STIMULATES FOOD WEB
+ FEED ON PREDATORS.
* Impact of harvesting on Family units.
NEED RIGHTS OF PASSAGE.

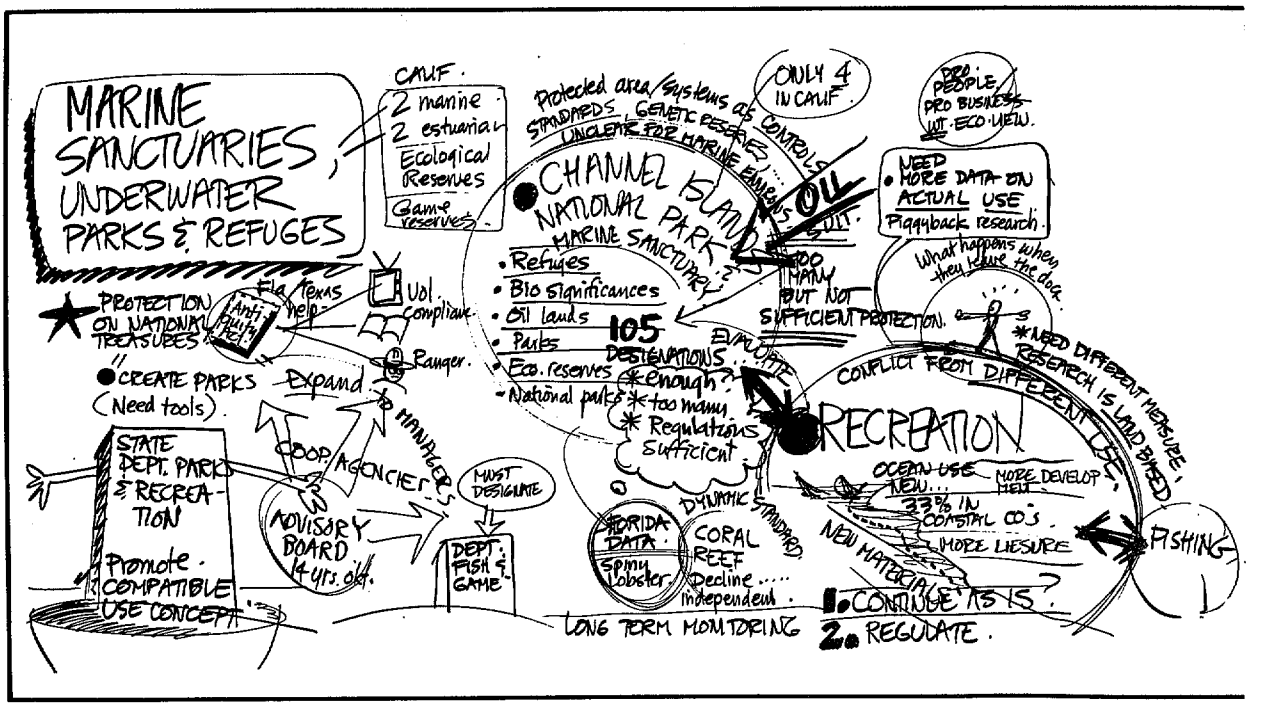
MARINE SANCTUARIES, UNDERWATER PARKS AND REFUGES PANEL

Moderator: John Epting
Office of Coastal Zone Management, NOAA
Washington, DC

Panelists: Charles Mehlert
Department of Parks and Recreation, Monterey, CA

Gary Davis
Channel Islands National Park, Ventura, CA

Carol Pillsbury
Channel Islands National Park, Ventura, CA

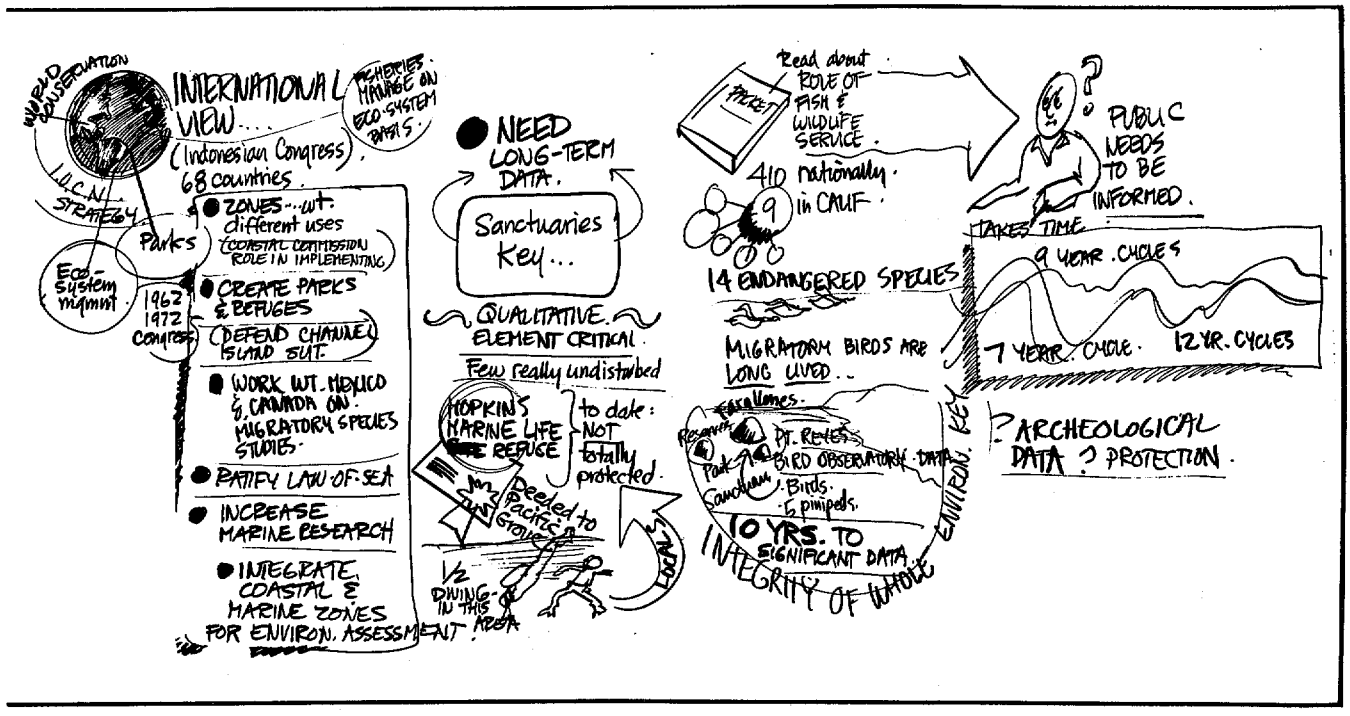


Neils West
University of Rhode Island, Kingston, RI

Maxine McCloskey
The Whale Center, Oakland, CA

Stephen Webster
Monterey Bay Aquarium, Monterey, CA

Roy Lowe
San Francisco Bay National Wildlife Refuge, Newark, CA



OFFSHORE ENERGY AND MINERAL RESOURCES AND INDUSTRIAL ACTIVITIES PANEL

Moderator: Conrad G. Welling
Ocean Minerals Company
Mountain View, CA

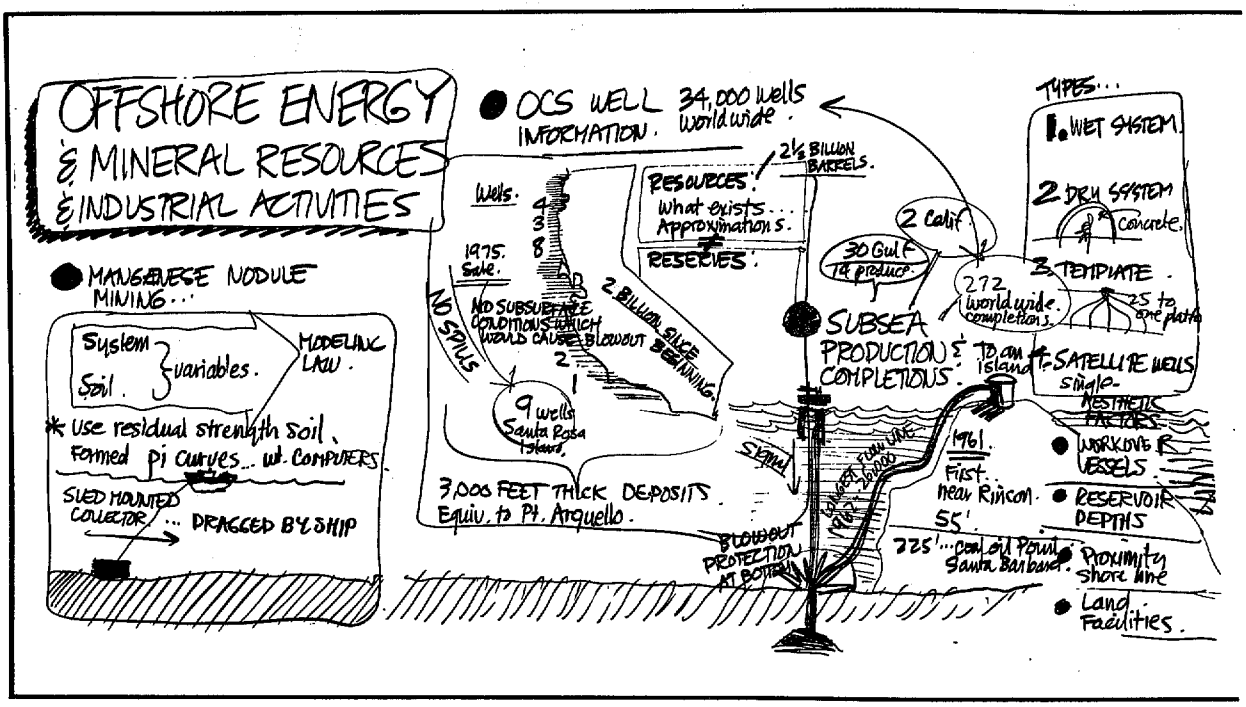
Panelists: Dr. Iraj Noorany
San Diego State University, San Diego

Dr. Dale Straughan
Dale Straughan International, Paramount, CA

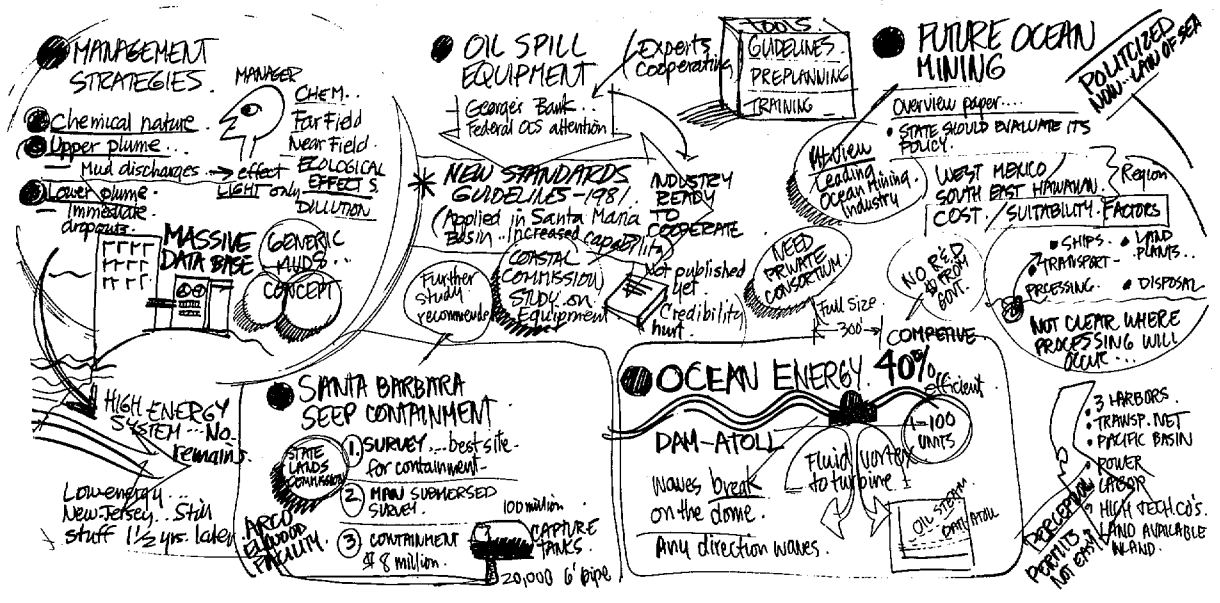
Donald L. Ziegler
Chevron, USA, Concord, CA

John B. Hundley
ARCO Oil and Gas Company, Bakersfield, CA

Dr. Don Maurer
Southern California Ocean Studies Consortium
California State University, Long Beach, CA



Kurt M. Shusterich, Woods Hole Oceanographic Institution, talks about the future of the ocean mining industry in California.



Dr. Robert A. P. Gaal
State Lands Commission, Long Beach, CA

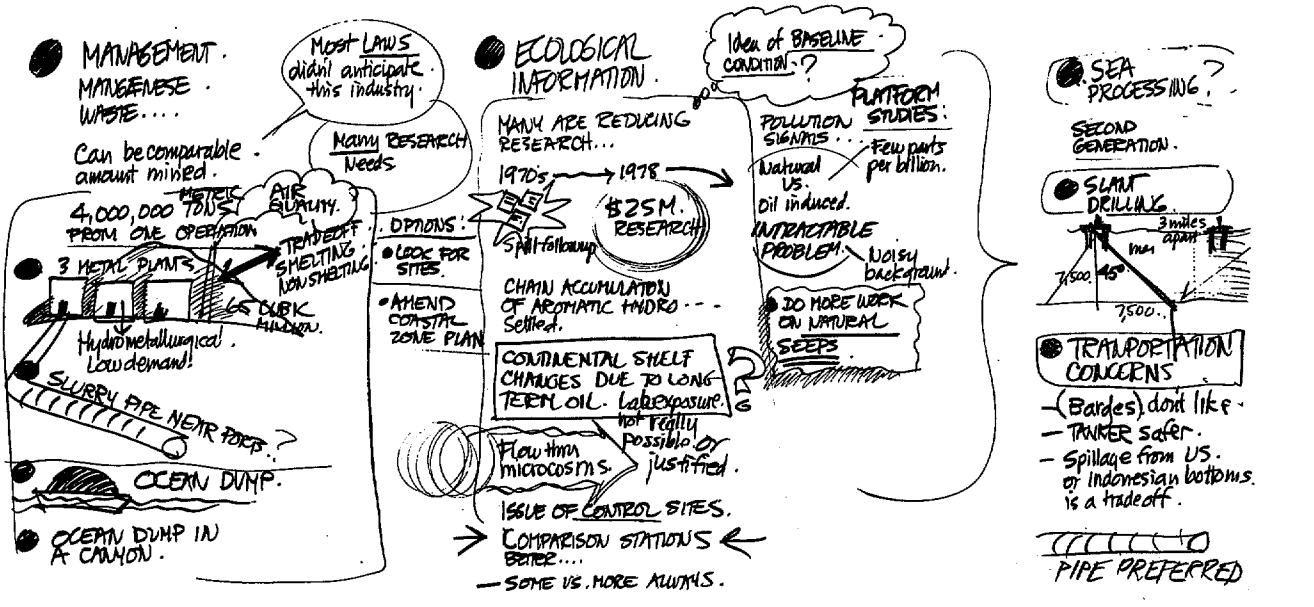
Commander L. A. Onstad
U.S. Coast Guard, Long Beach, CA

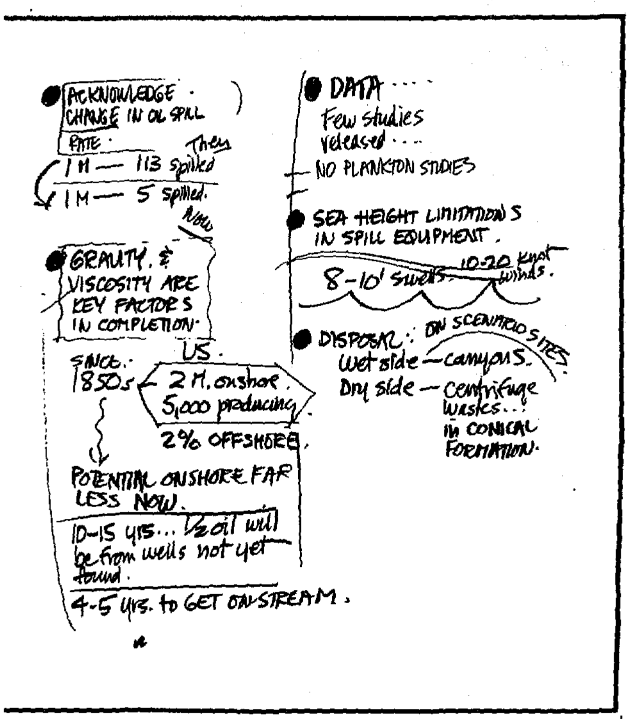
Clinton P. Sherburne
Lockheed Missiles and Space Company, Sunnyvale, CA

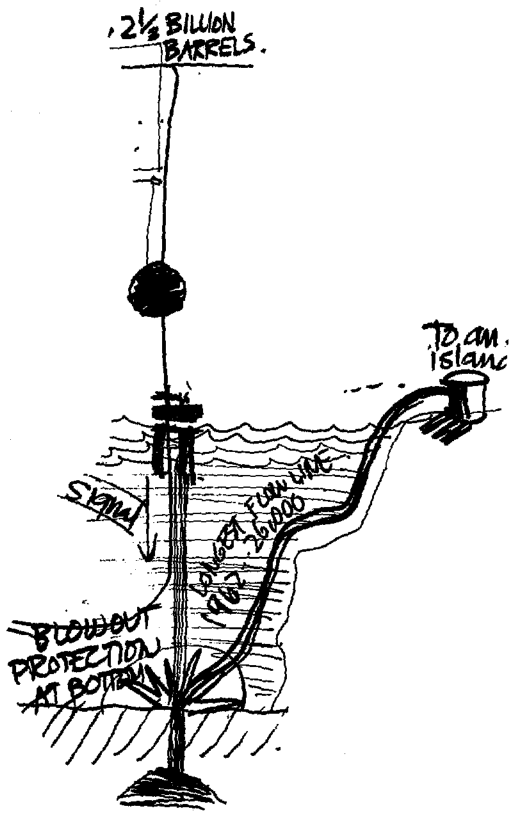
Dr. Kurt M. Shusterich
Woods Hole Oceanographic Institution, Woods Hole, MA

Patrick Kennedy
Rogers, Golden and Halpern, Philadelphia, PA

Dr. Robert B. Spies
Lawrence Livermore Laboratory, Livermore, CA




ACKNOWLEDGE CHANGE IN OIL SPILL RATE
Then
1 M — 113 spilled
1 M — 5 spilled.
Now
GRAVITY & VISCOSITY ARE KEY FACTORS IN COMPLETION.
US.
SINCE 1850s
2 M. onshore. 5,000 producing.
2% OFFSHORE.
POTENTIAL ONSHORE FAR LESS NOW.
10-15 yrs... ½ oil will be from wells not yet found.
4-5 yrs. to GET ON-STREAM.
DATA
Few studies released
NO PLANKTON STUDIES
SEA HEIGHT LIMITATIONS IN SPILL EQUIPMENT.
8-10' swells.
10-20 knot winds.
DISPOSAL: ON SCENARIO SITES.
Wet side — canyons.
Dry side — centrifuge wastes... in CONICAL FORMATION.


2½ BILLION BARRELS.
TO an island
Signal
BLOWOUT PROTECTION AT BOTTOM

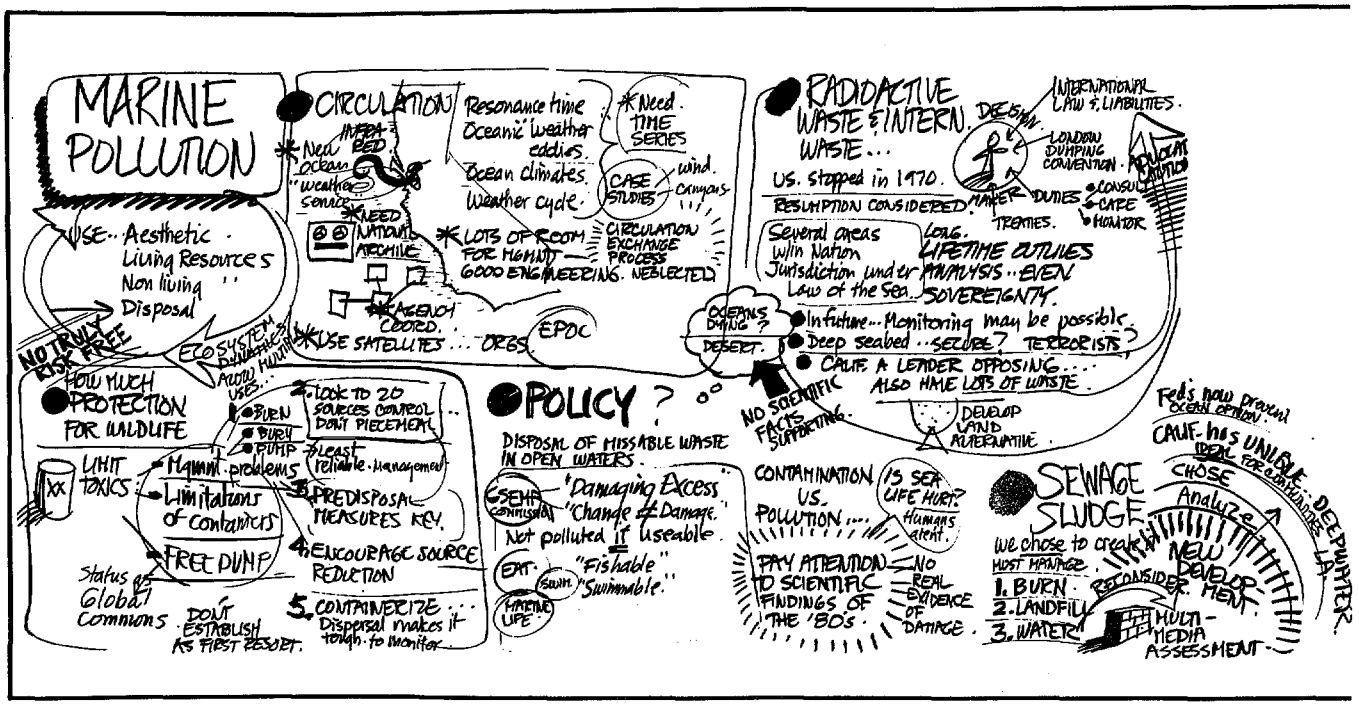
MARINE POLLUTION PANEL

Moderator: Dr. Welton L. Lee
California Academy of Sciences
San Francisco, CA

Panelists: Kenneth S. Kamlet
National Wildlife Federation, Washington, DC

Willard Bascom
Coastal Water Research Project, Long Beach CA

David D. Caron
Student, University of California Law School, Berkeley, CA

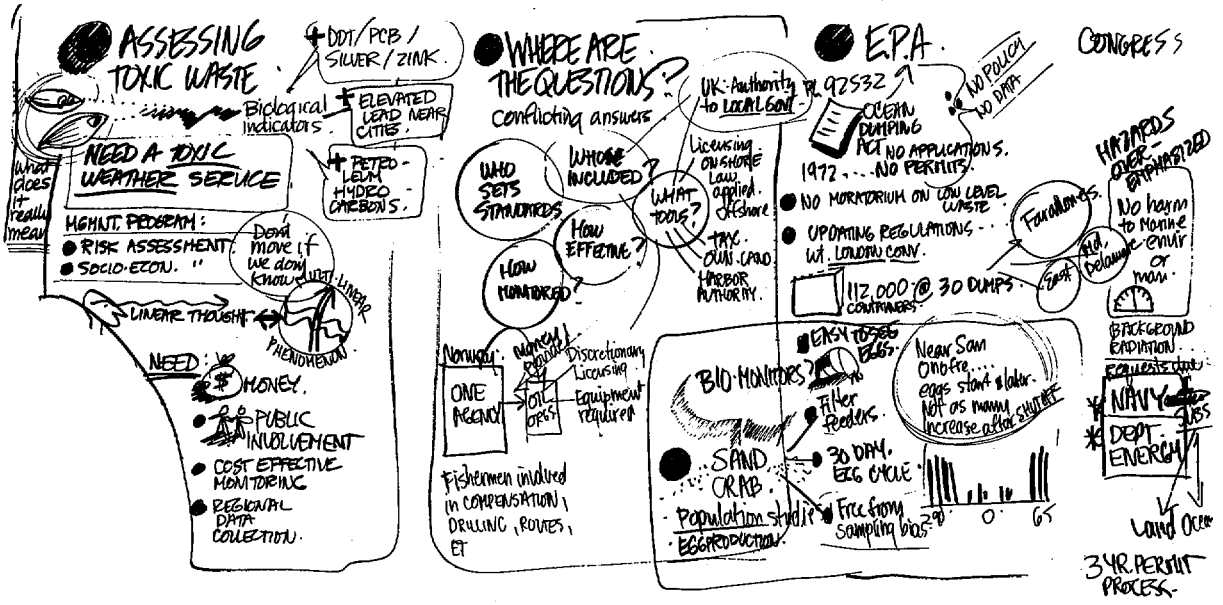


Douglas A. Segar
SEAMOcean, Inc., Wheaton, MD

Elaine Stamman
SEAMOcean, Inc., Wheaton, MD

Dr. Michael Martin
Department of Fish and Game, Monterey, CA

Dr. David W. Fischer
University of West Florida, Pensacola, FL



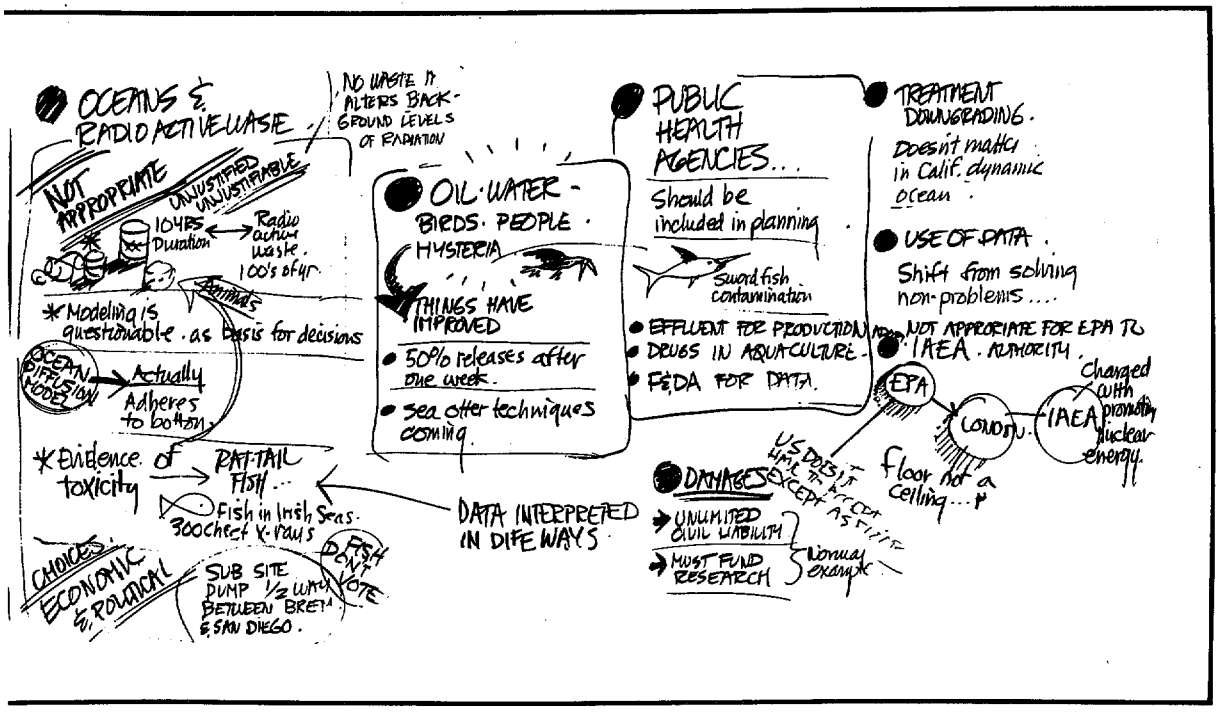
Adrian M. Werner
University of California, Santa Barbara, CA

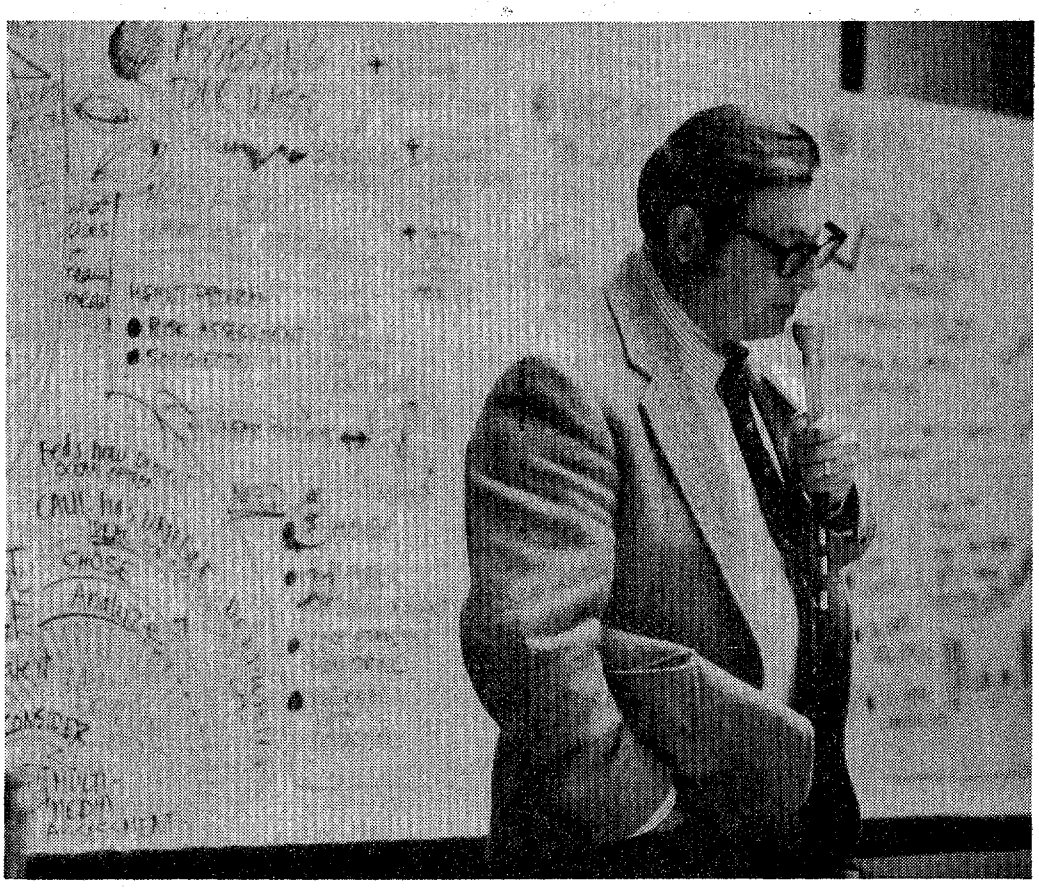
David L. Duncan
Environmental Protection Agency, San Francisco, CA

Dr. W. Jackson Davis
University of California, Santa Cruz, CA

David W. Alton
Food and Drug Administration, San Francisco, CA

Alice B. Berkner
International Bird Rescue Research Center, Berkeley, CA





Marine Pollution Panelist

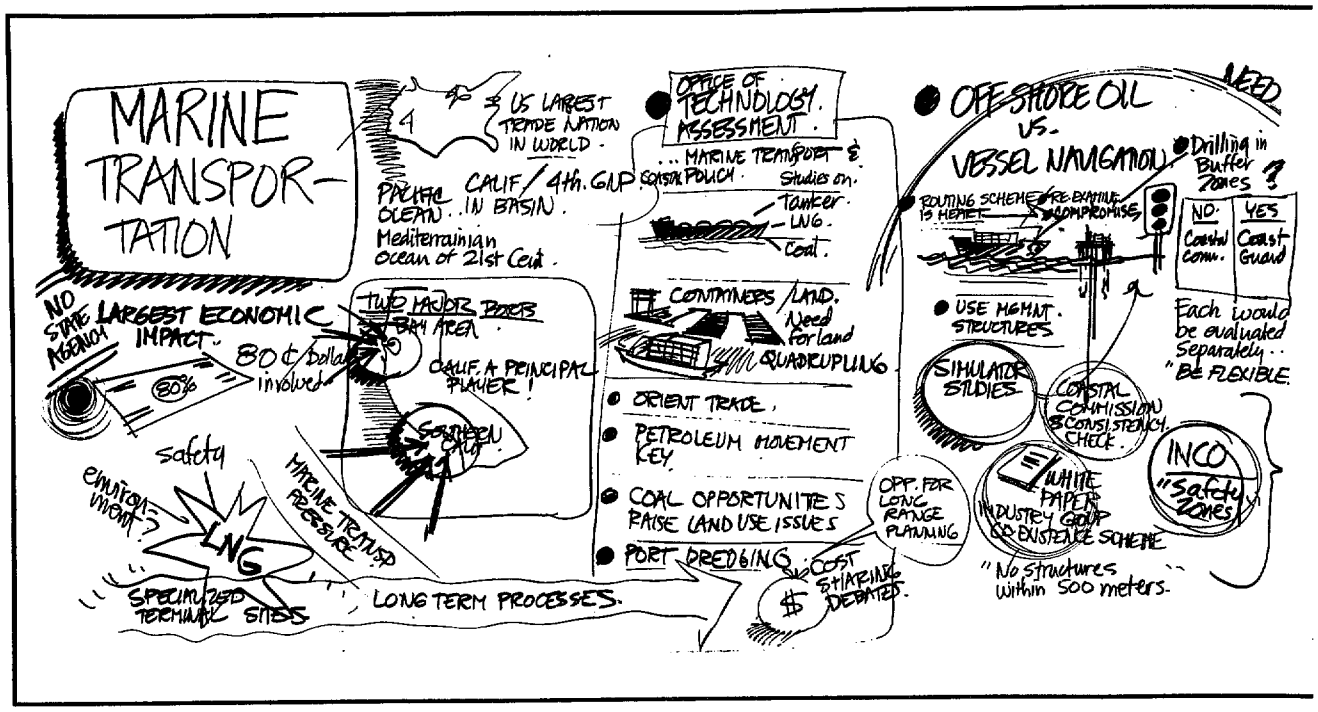
MARINE TRANSPORTATION PANEL

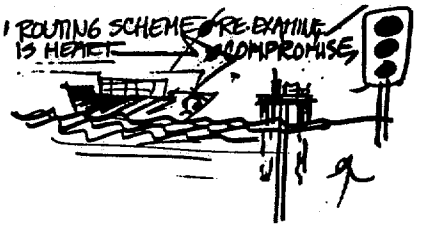
Moderator: Dr. Don Walsh
Institute for Marine and Coastal Studies
University of Southern California
Los Angeles, CA

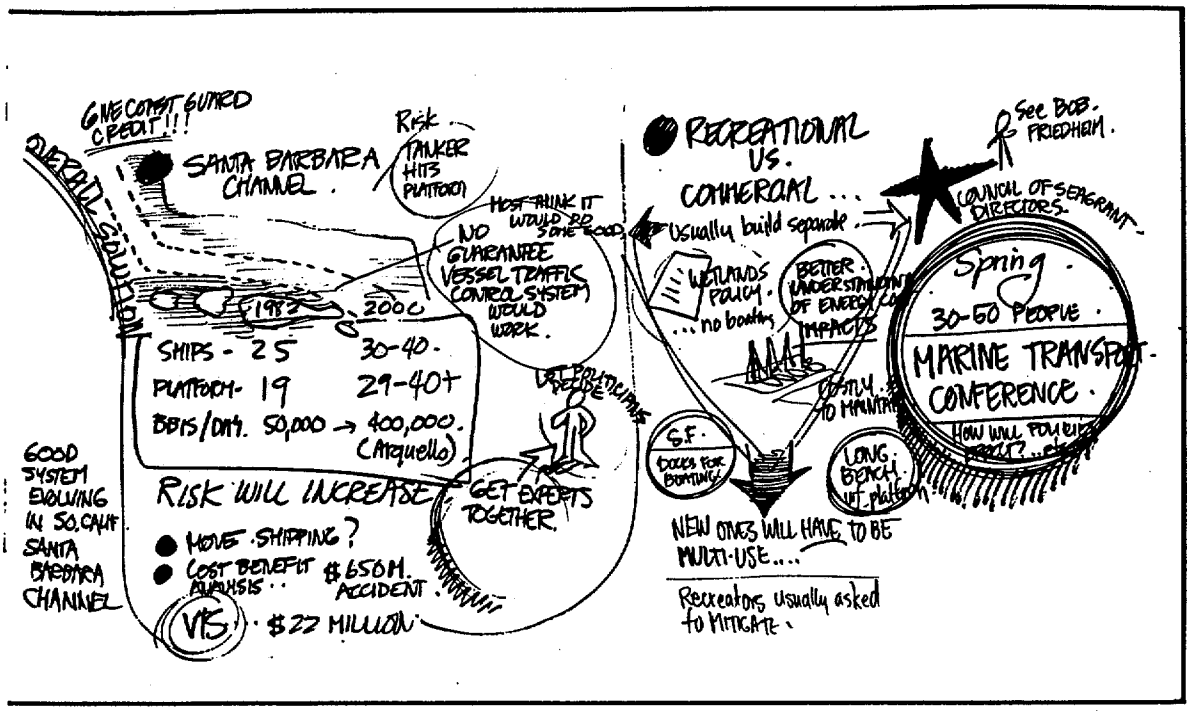
Panelists: Peter A. Johnson
Office of Technology Assessment, U.S. Congress, Washington, DC

Lt. Commander Jan E. TerVeen
U.S. Coast Guard, Long Beach, CA

Arent H. Schuyler, Jr.
University of California, Santa Barbara, CA




ROUTING SCHEME
IS HEART
RE-EXAMINE
COMPROMISE


GIVE COAST GUARD CREDIT!!
SANTA BARBARA CHANNEL
Risk
TANKER HITS PLATFORM
MOST THINK IT WOULD BE SOME GOOD
NO GUARANTEE VESSEL TRAFFIC CONTROL SYSTEM WOULD WORK.
1992
2000
SHIPS - 25
30-40
PLATFORM - 19
29-40+
BBLS/DAY. 50,000 → 400,000. (Arquello)
RISK WILL INCREASE
MOVE SHIPPING?
COST BENEFIT ANALYSIS
$650M. ACCIDENT
VTS
$22 MILLION
GET EXPERTS TOGETHER
GOOD SYSTEM EVOLVING IN SO. CALIF SANTA BARBARA CHANNEL
RECREATIONAL VS. COMMERCIAL...
usually build separate
WETLANDS POLICY
...no boating
BETTER UNDERSTANDING OF ENERGY CO IMPACTS
COSTLY TO MAINTAIN
S.F. DOCKS FOR BOATING
LONG BEACH
NEW ONES WILL HAVE TO BE MULTI-USE...
Recreators usually asked to MITIGATE.
See BOB FRIEDHEIM.
COUNCIL OF SEAGRANT DIRECTORS
Spring
30-50 PEOPLE
MARINE TRANSPORT CONFERENCE
HOW WILL POLICY

SHORELINE EROSION PANEL

Moderator: L. Thomas Tobin
California Coastal Commission
San Francisco, CA

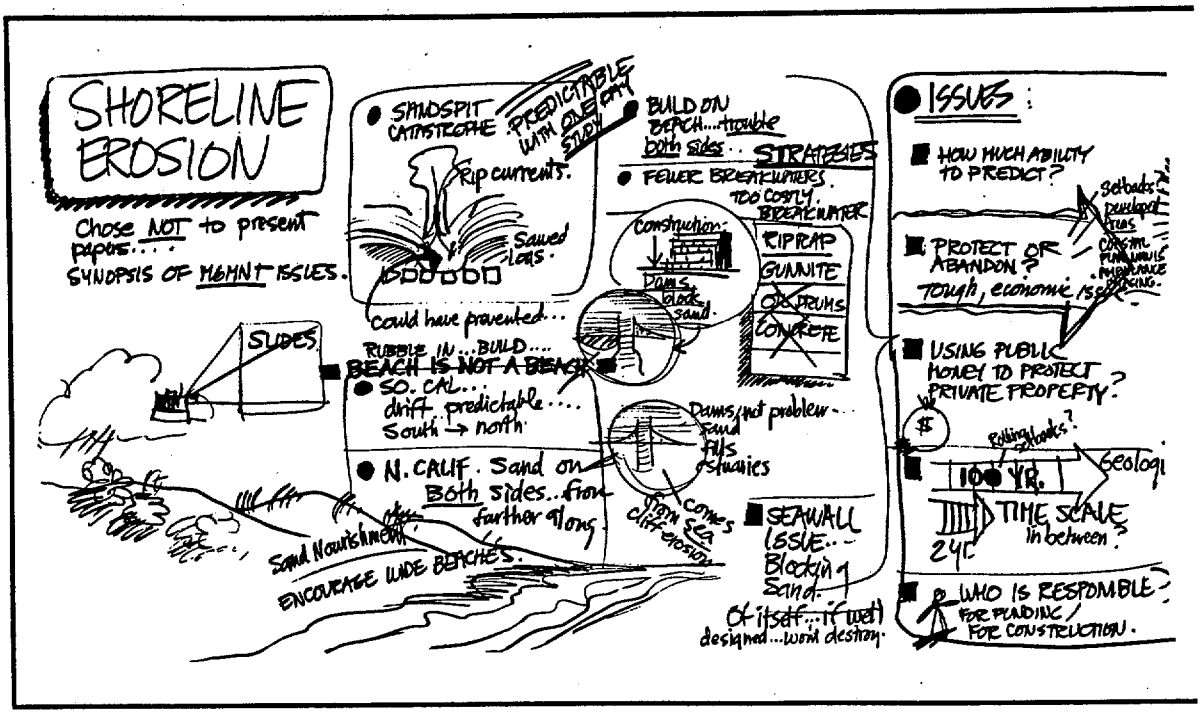
Panelists: Dr. Paul D. Komar
Oregon State University
Corvallis, OR

Dr. Gary B. Griggs
University of California
Santa Cruz, CA

Antony R. Orme
University of California
Los Angeles, CA

Amalie Brown
University of California
Los Angeles, CA

Richard J. Seymour
Department of Boating and Waterways
La Jolla, CA



Daniel Muslin
U.S. Corps of Engineers
Los Angeles, CA

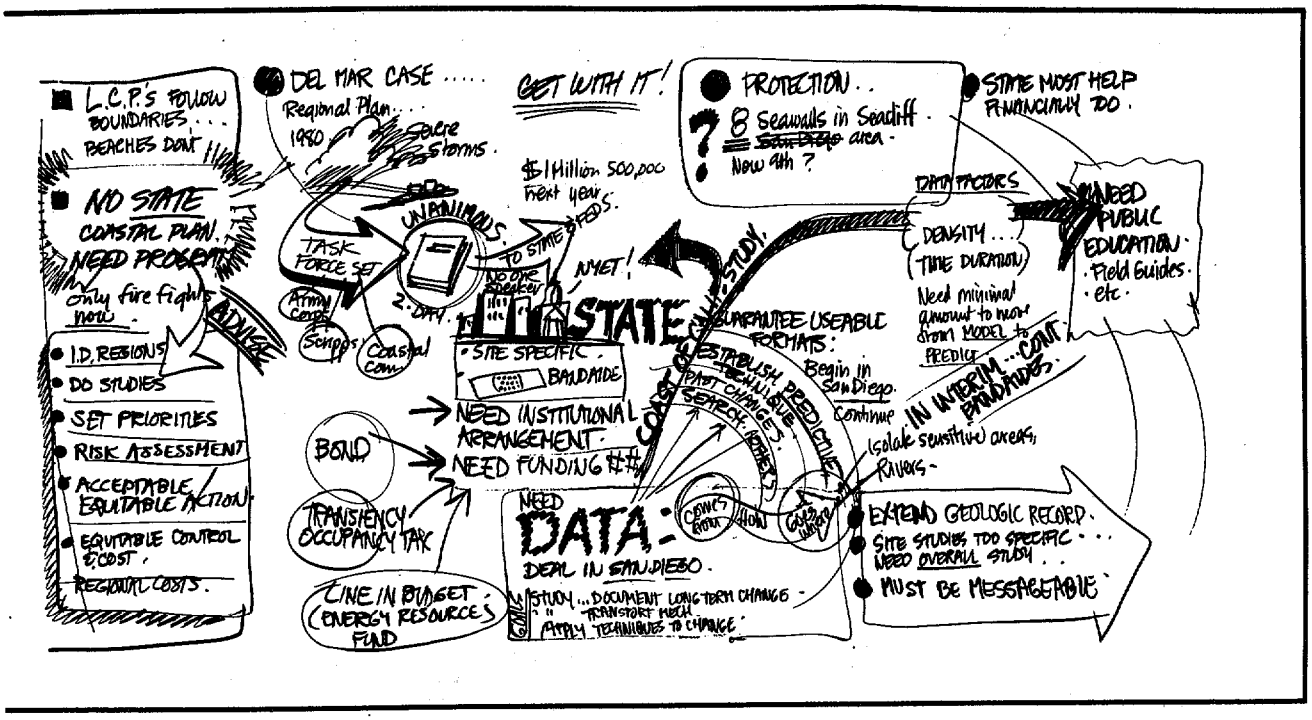
Carl Enson
U.S. Army Corps of Engineers
Los Angeles, CA

William Allayuad
California Coastal Commission
Santa Cruz, CA

Lou Terrell
San Diego Associations of Governments
Council, City of Del Mar
Del Mar, CA

Neil J. Maloney
California State University
Fullerton, CA

Dr. Derek J. Rust
Humboldt State University
Arcata, CA



MANAGEMENT TOOLS: RESEARCH, CONFLICT RESOLUTION, NEW APPROACHES PANEL

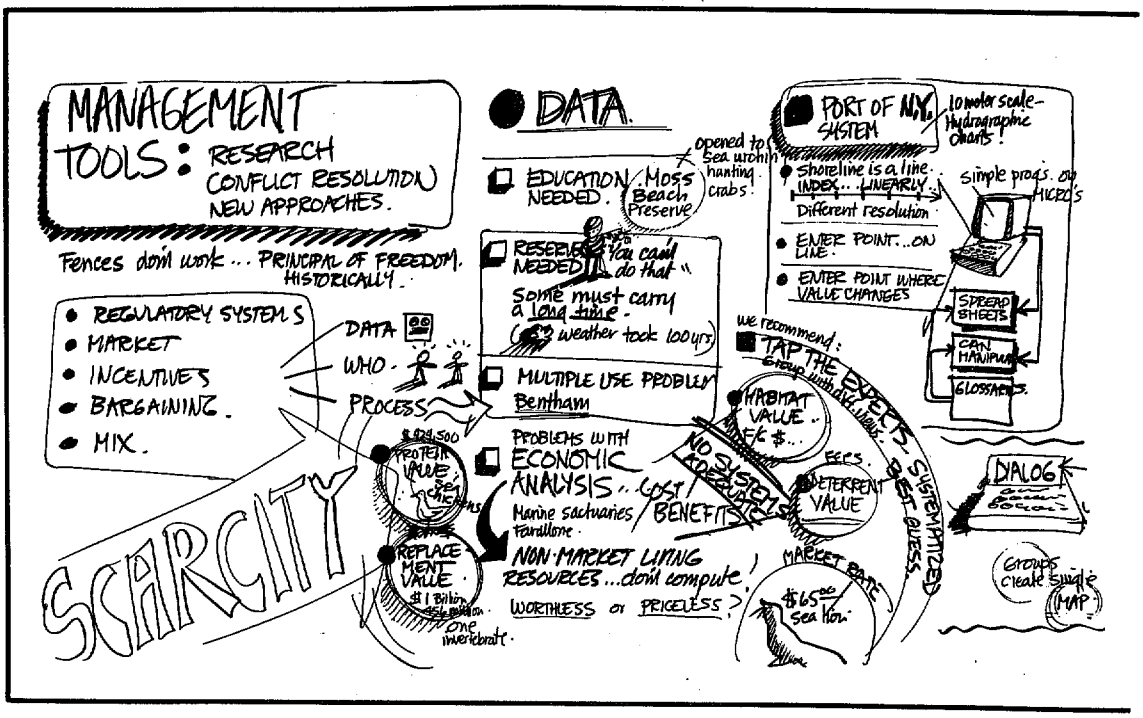
Moderator: Dr. Robert L. Friedheim
University of Southern California
Los Angeles, CA

Panelists: Joel W. Hedgpeth
Santa Rosa, CA

Richard J. Tinney, Jr.
Center for Environmental Education
Washington, DC

Dr. Peter K. Weyl
State University of New York
Stony Brook, NY

Dr. George Jenkins
Pacific Ocean Policy Studies
Palo Alto, CA



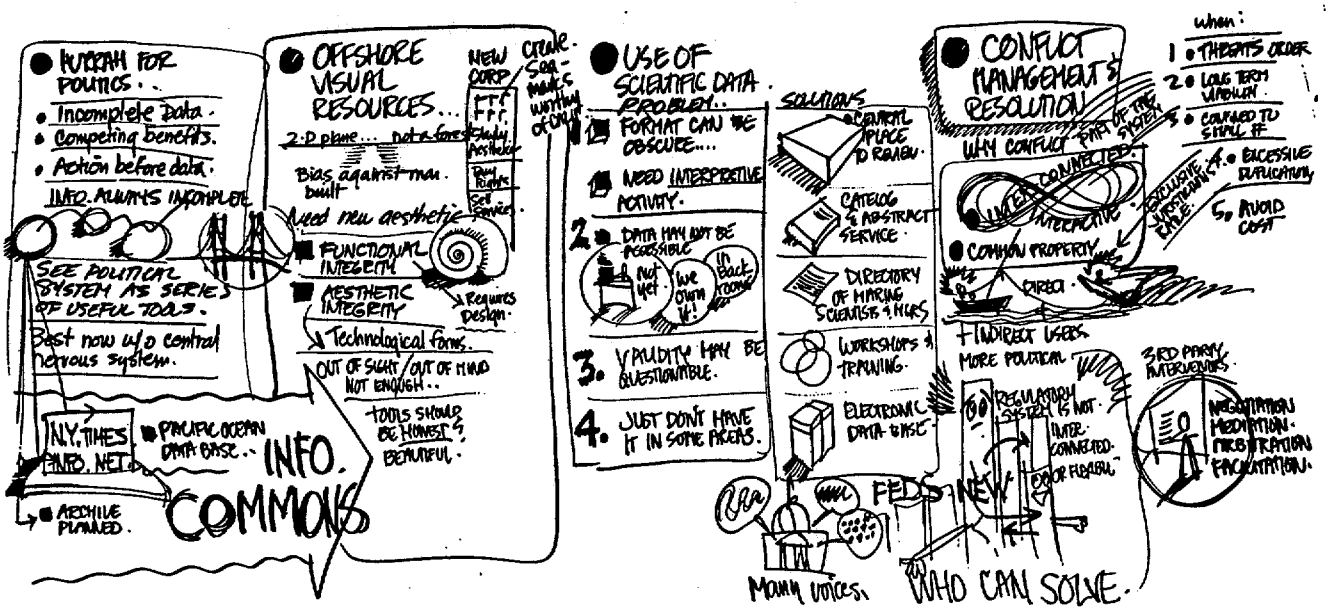
Dorothy Hallock
Chandler, AZ

James T. Chappell
San Francisco, CA

Dr. Ruthann Corwin
OCS Consultant, Marin County
Novato, CA

Dr. Michael J. Herz
The Oceanic Society
San Francisco, CA

Dr. Biliana Cicin-Sain
University of California
Santa Barbara, CA

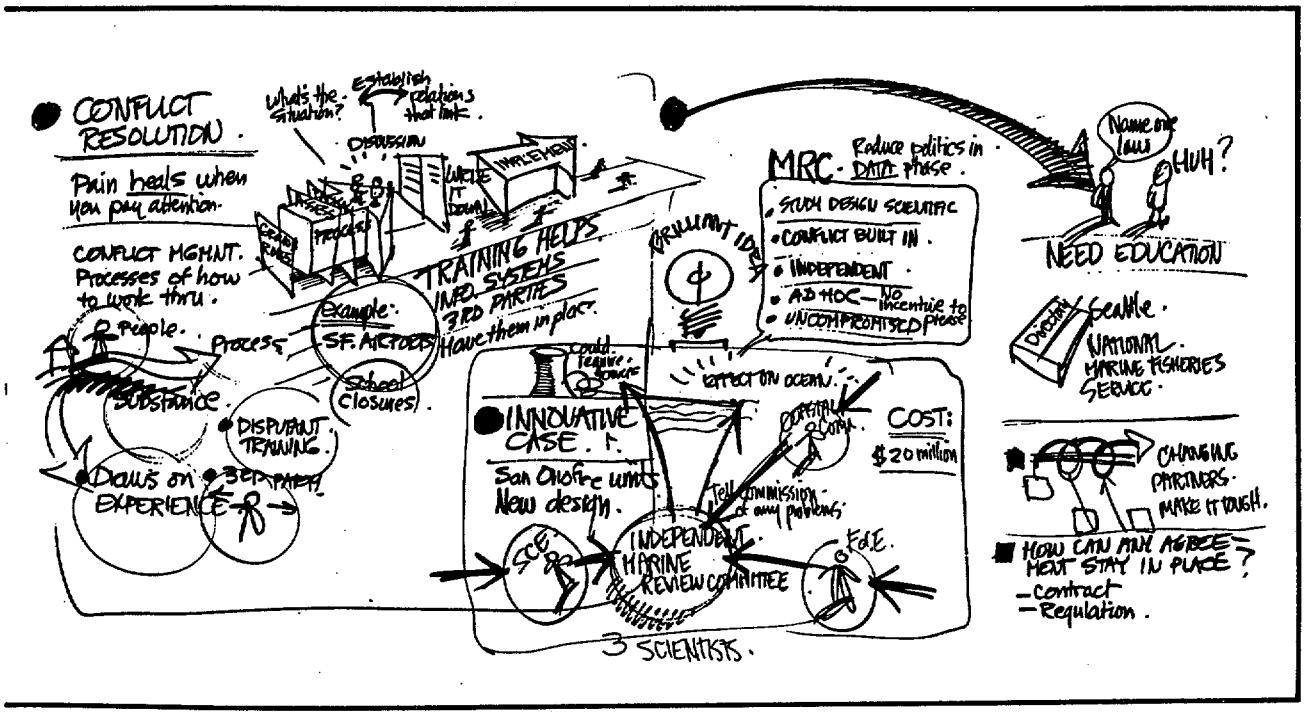


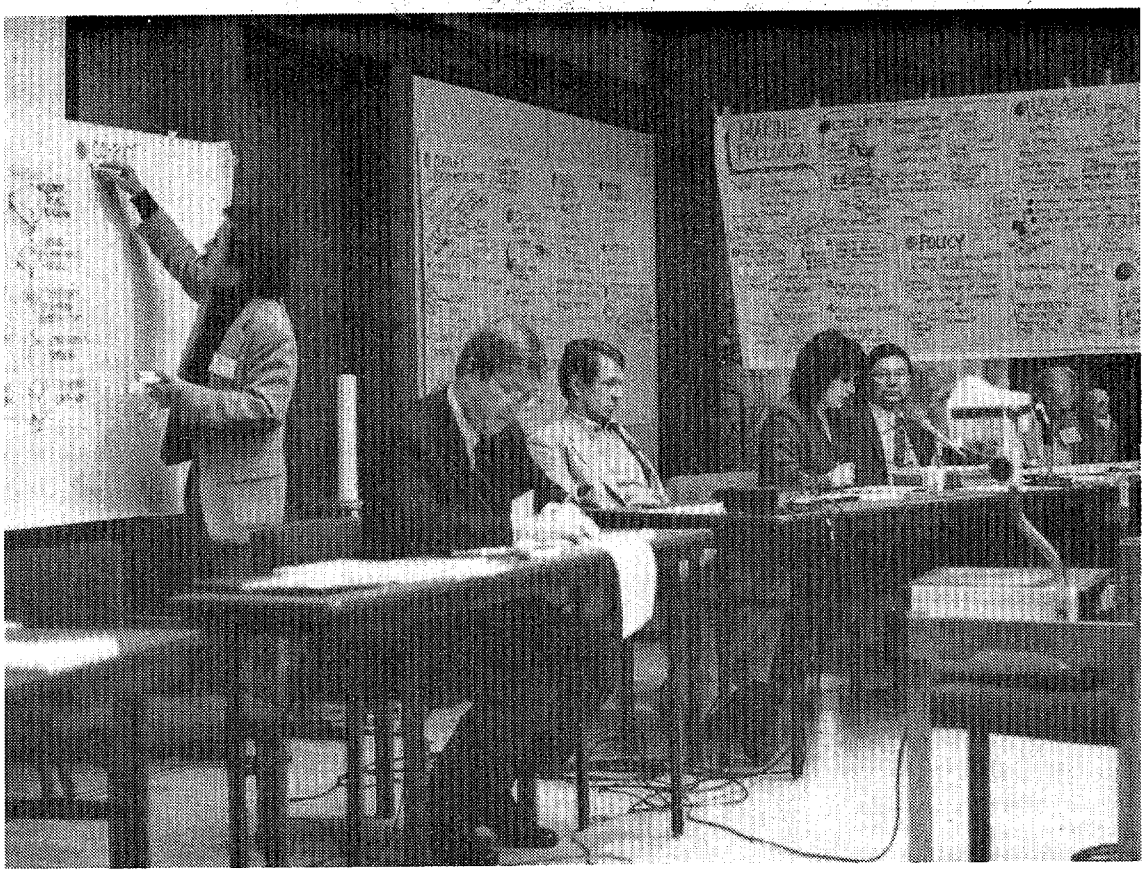
Phyllis Grifman
University of California
Santa Barbara, CA

Geoffrey H. Ball
Forum on Community and Environment
Palo Alto, CA

Charlotte Symons
Education Consortium for Productive Conflict
San Francisco, CA

Dr. William W. Murdoch
University of California
Santa Barbara, CA





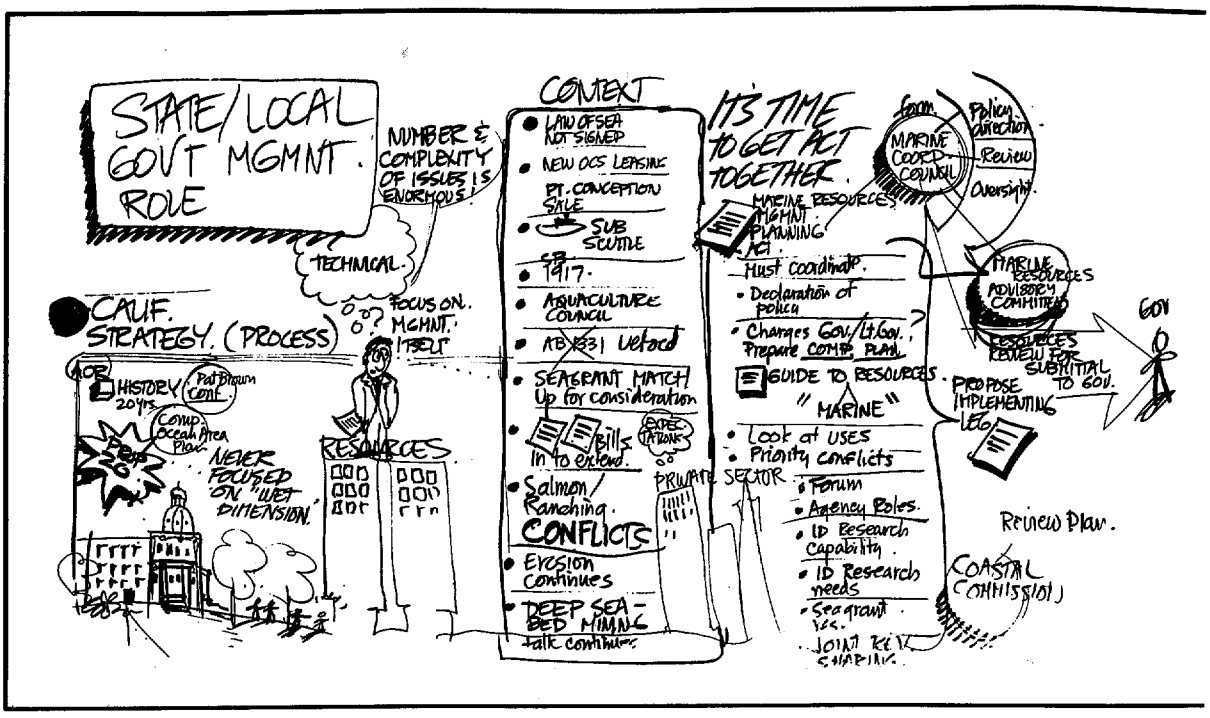
Panel on Management Tools: Research, Conflict Resolution and Other New Approaches.

STATE/LOCAL GOVERNMENT'S MANAGEMENT ROLE

Moderator: Michael B. Wilmar
San Francisco Bay Conservation and Development Commission
San Francisco, CA

Panelists: Dr. James W. Rote
Assembly Office of Research
Sacramento, CA

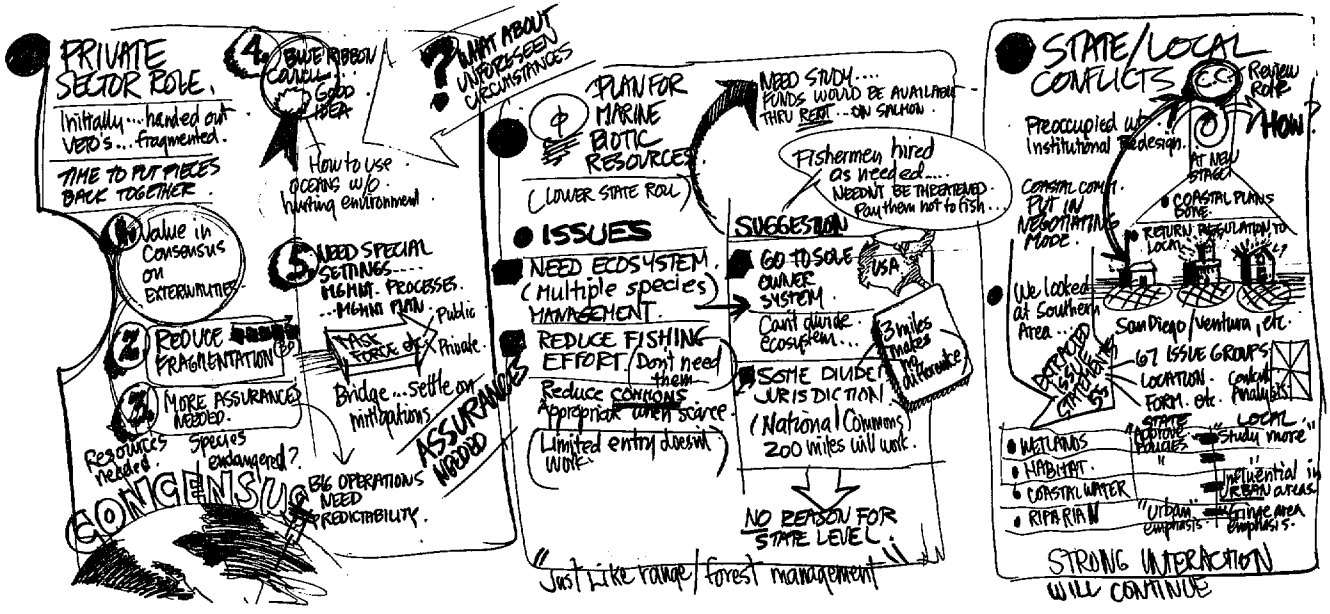
Dr. Elmer A. Keen
San Diego State University
San Diego, CA



Dr. Lowdon Wingo
University of Southern California
Los Angeles, CA

James Fawcett
University of Southern California
Los Angeles

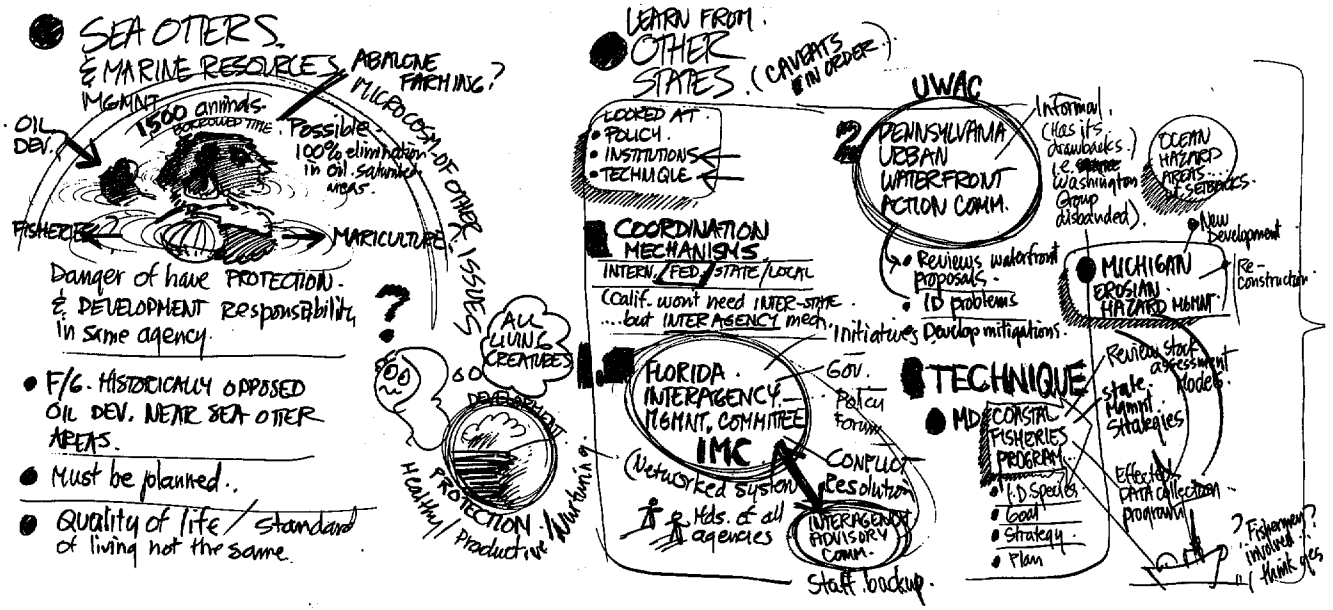
Carol Fulton
Friends of the Sea Otter
Carmel, CA

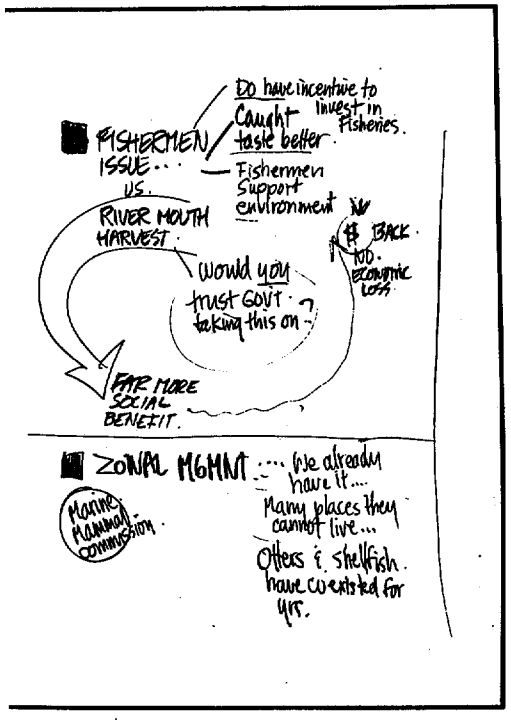


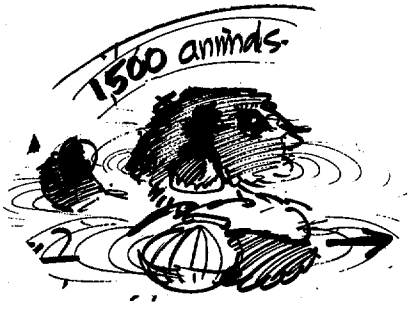
STATE/LOCAL GOVERNMENT'S MANAGEMENT ROLE (cont'd)

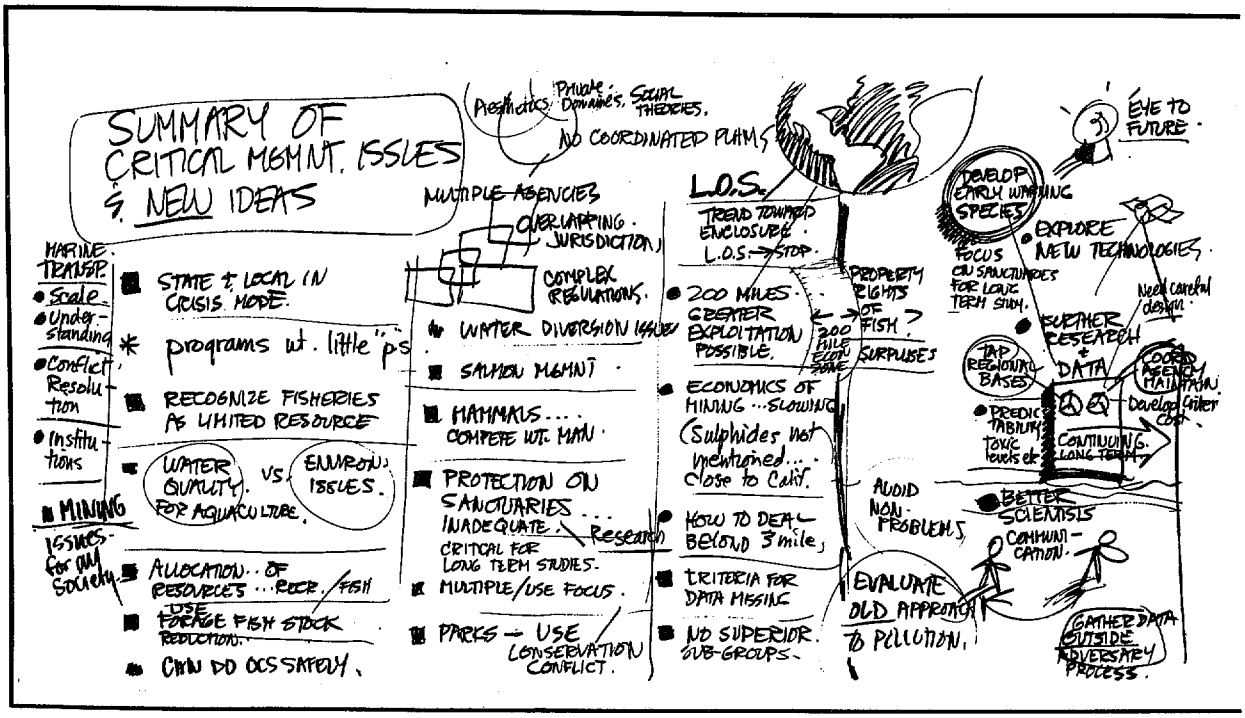
Lindell L. Marsh
Nossaman, Kreuger and Knox
Costa Mesa, CA

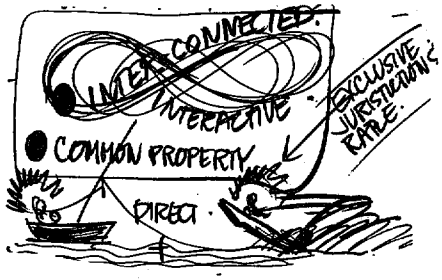
Vickie Allin
Office of Coastal Zone Management
Washington, DC

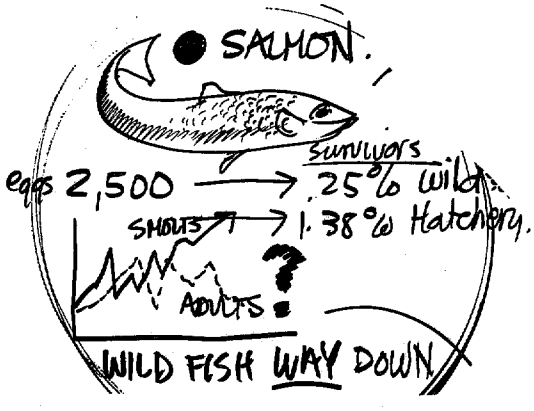


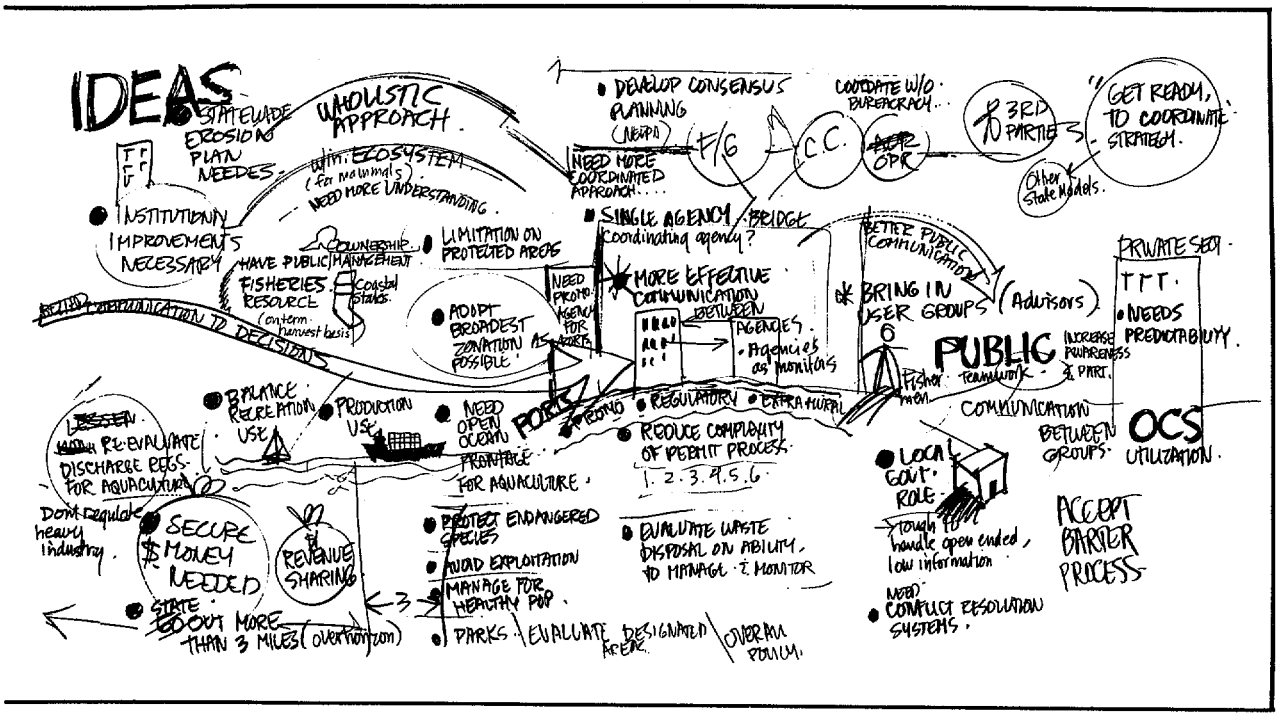

FISHERMEN ISSUE...
DO have incentive to Invest in Fisheries.
Caught taste better.
Fishermen Support environment
VS.
RIVER MOUTH HARVEST.
$ BACK. NO. Economic loss
would you trust GOVT. taking this on?
FAR MORE SOCIAL BENEFIT.
ZONAL MGMNT:.... We already have it....
Many places they cannot live...
Otters & shellfish have co-existed for yrs.
Marine Mammal Commission.

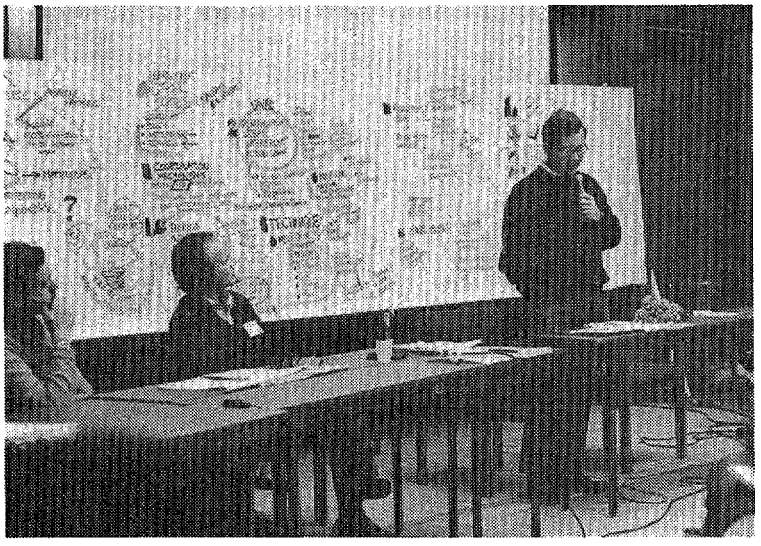

1500 animals.


SUMMARY OF CRITICAL MGMNT. ISSUES & NEW IDEAS
Prejudices, Private Domains, Social Theories.
NO COORDINATED PLANS
MULTIPLE AGENCIES
OVERLAPPING JURISDICTION
COMPLEX REGULATIONS.
L.O.S.
TREND TOWARD ENCLOSURE
L.O.S. → STOP
EYE TO FUTURE
DEVELOP EARLY WARNING SPECIES
EXPLORE NEW TECHNOLOGIES
FOCUS ON SANCTUARIES FOR LONG TERM STUDY.
Need careful design
WEATHER RESEARCH + DATA
TAP REGIONAL BASES
DOES AGENCY MAINTAIN
Develop Criteria
PREDICTABILITY TOXIC levels etc
CONTINUING LONG TERM
MARINE TRANSP.
Scale
Understanding
Conflict Resolution
Institutions
STATE & LOCAL IN CRISIS MODE.
programs wt. little "ps"
RECOGNIZE FISHERIES AS LIMITED RESOURCE
WATER QUALITY. VS ENVIRON. ISSUES.
FOR AQUACULTURE.
MINING
ISSUES for all Society
ALLOCATION... OF RESOURCES ... BEER / FISH
USE FOREIGN FISH STOCK REDUCTION.
CAN DO OCS SAFELY.
WATER DIVERSION ISSUES
SALMON MGMNT.
MAMMALS.... COMPETE WT. MAN.
PROTECTION ON SANCTUARIES ... INADEQUATE. Research
CRITICAL FOR LONG TERM STUDIES.
MULTIPLE/USE FOCUS.
PARKS — USE / CONSERVATION CONFLICT.
200 MILES ... GREATER EXPLOITATION POSSIBLE.
PROPERTY RIGHTS OF FISH?
200 MILE ECON ZONE
SURPLUSES
ECONOMICS OF MINING ... SLOWING
(Sulphides not unchained.... close to Calif.
HOW TO DEAL BEYOND 3 mile
CRITERIA FOR DATA MISSING
NO SUPERIOR SUB-GROUPS.
AVOID NON-PROBLEMS
EVALUATE OLD APPROACH TO POLLUTION.
BETTER SCIENTISTS
COMMUNICATION
GATHER DATA OUTSIDE ADVERSARY PROCESS.


INTER-CONNECTED.
INTERACTIVE
EXCLUSIVE JURISDICTION RARE.
COMMON PROPERTY
DIRECT


SALMON.
eggs 2,500
Survivors
25% wild
SMOLTS
1.38% Hatchery.
ADULTS
WILD FISH WAY DOWN





Chairman William J. Whalen at end of the Symposium with Frank H. Talbot, right and Michael L. Fischer, center.

Appendix C

REPORT OF PANEL MODERATORS' CHAIRMAN

REPORT OF PANEL MODERATOR S' CHAIRMAN

That the Ocean Studies Symposium was a success is due in no small measure to the hard work of the Panel Moderators. I am grateful to them for their help in organizing their panels and in the production of their summaries for the Core Group meeting. They made the task of the Panel Moderator's Chairman a sinecure.

The Symposium reflected the realities of the off-shore area by the great scope covered by the papers and the airing of different viewpoints. Large conferences are usually divided into disciplinary or functional units, and no one person is able to cover the whole conference. Here the deliberate decision of the organizers to have all speakers presenting consecutively in one room forced them to deal with salient points only, and gave participants a chance to experience the total conference. The result was an overview, broad and rapid, of the extent of uses of California's marine resources, and present and potential conflicts. Panel Moderators, after their first shock at the time constraints, worked with their Panelists to cut all talks to the minimum. Although there is little doubt that some depth was lost, I do not believe that there was much that was significant in scope or conflict that was not reflected in the Symposium. Those who stayed the course watched an up-to-date picture develop that was broader than one is normally able to observe. Conflicts and special pleadings were sometimes obvious, but these were not swept quickly under the carpet. They exposed multiple use difficulties, and although solutions to these were not found, sometimes ideas developed that pointed the way to possible resolution.

This was not a perfect Symposium - none ever is - but it was successful in its educative value to its participants, and for its very great breadth and its pointers to the way management might need to go. I am grateful for the interaction with Symposium Chairman Bill Whalen and Facilitator David Sibbet, the former for urbane and easy-going running of the meetings, and the latter for his sensitivity and speed in getting us out of many difficult moments. And I thank the Panel Moderators for their efforts to achieve good meetings, and production of summaries under time duress.

Frank H. Talbot
Chairman, Panel Moderators

Appendix D

ASSEMBLY CONCURRENT RESOLUTION NO. 15

ASSEMBLY CONCURRENT RESOLUTION NO. 15

Introduced by Assemblymen Farr, Willie Brown, Filante, Hauser, Hayden, O'Connell, and Peace

December 27, 1982

Assembly Concurrent Resolution No. 15—Relative to ocean resources.

LEGISLATIVE COUNSEL'S DIGEST

ACR 15, as amended, Farr. Ocean resources.

This measure would direct the Joint Committee on Fisheries and Aquaculture to evaluate an ocean studies symposium report prepared by the California Coastal Commission and the Department of Fish and Game, to hold a hearing in the spring of 1983 on marine resource management, and to submit an action plan on marine resource management to the Legislature by October 1, 1983, with assistance from the Assembly Office of Research and the Senate Office of Research.

Fiscal committee: no.

WHEREAS, The economic value of the marine resources that California enjoys because of its 1,100-mile boundary on the Pacific Ocean constitutes a natural wealth of enormous magnitude; and

WHEREAS, The marine resources off the shore of California have provided food, energy, recreation, employment, and have historically contributed to the general welfare of our citizens; and

WHEREAS, Man's activities in the marine environment can have a profound short-term and long-term impact on that environment and can greatly affect the resources therein; and

WHEREAS, Man will increasingly be forced to rely on marine resource as other resources are depleted, and our ability to protect, preserve, develop, and utilize these resources is related to our understanding of multiple-use conflicts and comprehensive resource management; and

WHEREAS, The state's interest in the ocean has been fragmented, sporadic, and narrowly limited, without statewide objectives for the management of marine resources or a clear statutory statement of functional responsibility for marine resources as a whole; and

WHEREAS, The California Coastal Commission and the Department of Fish and Game jointly sponsored an ocean studies symposium from November 7 to 10, 1982, which examined ocean resource use conflicts and management alternatives; and

WHEREAS, The California Coastal Commission and the Department of Fish and Game will jointly submit a report to the Governor and the Legislature in February 1983, highlighting the results of the ocean studies symposium; now, therefore, be it

RESOLVED by the Assembly of the State of California, the Senate thereof concurring, That the Legislature recognizes the importance and economic value of our marine resources and that comprehensive resource management plans are urgently needed to guarantee the long-term viability of these precious resources; and be it further

RESOLVED, That the Joint Committee on Fisheries and Aquaculture evaluate the ocean studies symposium report and recommend to the Legislature an action plan for implementation; and be it further

RESOLVED, That the Joint Committee on Fisheries and Aquaculture hold an oversight hearing in the spring of 1983 on the matter of marine resource management, and with staff assistance from the Assembly and Senate Offices of Research, submit an action plan to the Legislature by October 1, 1983; and be it further

RESOLVED, That in order to fulfill its prescribed duties, the Joint Committee on Fisheries and Aquaculture seek the cooperation and assistance of the California Coastal Commission, the Department of Fish and Game, the State Water Resources Control Board, the State Lands Commission, and other state, local, and federal agencies with responsibility for marine resource management; and be it further

RESOLVED, That the Chief Clerk of the Assembly transmit a copy of this resolution to the Chairman and the Vice Chairman of the Joint Committee on Fisheries and Aquaculture, to the Director of the Assembly Office of Research, and to the Director of the Senate Office of Research.

Appendix E

STATE AND FEDERAL ROLES AND RESPONSIBILITIES

As part of the Ocean Studies Symposium planning, all state and federal government agencies involved in marine resources issues were asked to submit a brief description of their role and responsibilities. The following agencies' responses are included for your reference:

California Resources Agency
--Air Resources Board
--Coastal Commission
--Coastal Conservancy
--Department of Boating and Waterways
--Department of Fish and Game
--Department of Parks and Recreation
--San Francisco Bay Conservation and Development Commission

California State Lands Commission

California Energy Commission

California Seismic Safety Commission

California Department of Business, Transportation and Housing

California Governor's Office of Planning and Research

U.S. Department of Commerce
--NOAA/National Marine Fisheries Service
--NOAA/Office of Coastal Zone Management
--Pacific Fishery Management Council

U.S. Department of the Interior
--Bureau of Land Management
--Bureau of Mines
--Fish and Wildlife Service
--Minerals Management Service

U.S. Department of Transportation
--Coast Guard/11th and 12 Districts

U.S. Department of Health and Human Services
--Food and Drug Administration

U.S. Department of Housing and Urban Development

Federal Maritime Commission

CALIFORNIA RESOURCES AGENCY

CALIFORNIA AIR RESOURCES BOARD

The Air Resources Board's (ARB) role in marine resources management has focused primarily on air quality aspects of oil and gas development in the state tidelands and the Outer Continental Shelf (OCS). The ARB has also looked at air quality impacts resulting from marine transportation activities unrelated to oil and gas development.

To put the role of the ARB into perspective, the following is a brief description of the responsibility of the ARB and local air pollution control authorities. As provided in the California Health and Safety Code, the ARB is the state agency charged with coordinating efforts to attain and maintain ambient air quality standards. In California, the responsibility for controlling air pollution is divided between the Air Pollution Control Districts [APCDs] and the state. The local APCDs have the primary responsibility for controlling emissions from all stationary sources or non-vehicular sources. The state's role is to control mobile sources, coordinate efforts to attain and maintain state and federal ambient standards, upon the recommendation of the Department of Health Services.

State law invests primary responsibility for the control of stationary sources in local APCDs but also invests review responsibility in the ARB. The ARB has overall responsibility for coordinating the California air program and is the air pollution control agency for all purposes set forth in federal law. Thus, the ARB reviews local plans to attain air quality standards, as well as local rules, regulations and enforcement practices. If a review of a local program indicates a need for such, the ARB may hold public hearings to determine if a local agency is satisfactorily carrying out its responsibilities under state law. If a finding is made that the local agency is not fulfilling its responsibilities, the ARB is empowered to undertake direct control activities.

Recently, there has been a number of air quality studies conducted by various government agencies that concluded that emissions from offshore oil and gas activities are impacting onshore air quality. Many of the coastal areas are currently violating state and federal ambient air quality standards. Thus, the continued development of offshore oil and gas in the OCS without proper mitigation of the air quality impacts will make it difficult for onshore areas to attain and maintain applicable ambient air quality standards. If the federal standards are not attained, the Environment Protection Agency can impose a number of sanctions on the state such as withholding funds for highway and sewer treatment facilities and a moratorium on new construction.

It is for these reasons that the ARB has been very active in the review of offshore projects and has supported the position that emissions from such projects should be mitigated. As one means of pursuing whatever remedies are available to ensure emissions from onshore facilities are dealt with appropriately, the ARB provides assistance to the California Coastal Commission when a determination of consistency with the California Coastal Zone Management Plan (CZMP) must be made for a project that may impact marine air resources. The U.S. Coastal Zone Management Act mandates that the air quality requirements of state and local governments be incorporated into any CZMP. In turn, the Act requires that all OCS plans affecting any land use or water use be consistent with the CZMP.

The CZMP provides that new industrial development shall be located where it will not have significant adverse effects, whether individually or cumulatively, on coastal resouces. Present federal air quality review fails to take into account the cumulative offshore impacts of many OCS projects, each of which may individually be exempted from all air pollution control by virtue of Department of Interior regulations. Therefore, a determination of consistency with regard to cumulative air quality impacts and their mitigation is necessary in order to preserve the quality of marine air resources. The ARB provides technical assistance to the California Coastal Commission in making the determination.

Marine vessel emissions along California's coastline have a significant impact on the air quality of coastal areas, especially in the South Coast Air Basin and the San Francisco Bay Area; such emissions are also quantifiable and are largest during activities which occur in close proximity to the onshore facilities with which they are associated. The ARB has been particularly concerned with marine vessel emissions that come ashore and reduce the ability of the area to attain and maintain the state and federal ambient air quality standards.

Emissions from marine vessels are not regulated at the state level in California. However, emissions from these sources are regulated by the rules and regulations of several local APCDs. Such regulations require emissions from marine vessels to be included when calculating the emissions from that source for new source permitting purposes. This means that marine vessel emissions are included as emissions from a stationary source when determining the air quality impacts from the source.

CALIFORNIA COASTAL COMMISSION

The 1976 Coastal Act was enacted by the California State Legislature to provide for the conservation and development of California's 1,100-mile coastline. It established a unique state and local partnership to assure that public concerns of statewide importance were reflected in local decisions about coastal development. The Act followed four years of coastal regulation under Proposition 20 (the "Coastal Initiative"), which established the Coastal Commission in 1972. The Act is based on recommendations in the Coastal Plan that was prepared by the Commission under Prop 20 and submitted to the Legislature in 1975.

The Coastal Act enacts state policies covering such matters as public access to the coast, coastal recreation, the California marine environment, coastal land resources, and coastal development, including industrial development. Each local government along the coast (15 counties and 52 cities) is incorporating these policies in its own Local Coastal Program.

Under the Act, each of the state's 67 coastal cities and counties must prepare its own land use plan and zoning ordinances to protect coastal resources and set guidelines for future developments. The Coastal Commission must determine that these plans and ordinances, Local Coastal Programs (LCPs), conform with policies in the Coastal Act. Once a city or county has an approved LCP, it can issue its own coastal permits. Only specific types of permits may be appealed to the State Commission. Cities and counties are reimbursed for the cost of preparing the LCPs. Under 1981 legislation, cities and counties with certified Land Use Plans must issue their own coastal permits while they continue to prepare zoning ordinances. Until the ordinances are approved by the Commission, all of these local coastal permits may be appealed to the Commission.

Neither Proposition 20 nor the Coastal Act called for a moratorium on coastal development. Over 95 percent of the more than 50,000 coastal permits processed since 1973 have been approved by the Commission, many with conditions that make the project conform with Coastal Act policies such as public access. When a permit is denied, the Commission often bases part of its denial on the need to allow the local government to complete its LCP. Once the LCP is completed, many of these projects can be resubmitted and approved if they conform to the local plan.

Under the Coastal Act, most structures or activities that modify land or water use in the coastal zone require a development permit from the Coastal Commission. However, most repairs and improvements to single-family homes, other structures and public works facilities are exempt. The critieria used by

the Commission for granting or denying permits are the Coastal Act policies or the policies in an approved Land Use Plan for the area. In addition, the Commission has adopted interpretive guidelines to help permit applicants and local governments understand previous Commission decisions on such Coastal Act policies as public access or wetlands.

The California Coastal Commission has 12 voting members and 3 non-voting members. Six of the voting members are "public members," and six are local elected officials who represent coastal districts. All voting commissioners are appointed by either the Governor, Senate Rules committee, or the Speaker of the Assembly; each appoints four commissioners, two public members and two elected officials. Each commissioner may appoint an alternate to serve during his or her absence. The Secretary of the Resources Agency, Secretary of the Business and Transportation Agency, and the Chairperson of the State Lands Commission serve as nonvoting members and may appoint a designee to serve in their place.

In addition to its Local Coastal Program work and reviewing coastal development permits, the Commission must, among other tasks, perform the following:

- review certain federal activities (including plans to explore and extract oil and gas from the Outer Continental Shelf) for consistency with California's federally approved Coastal Management Program;
- allocate federal Coastal Energy Impact Program funds to jurisdictions affected by coastal energy developments;
- review and certify long-range development plans for major public works, and state universities and colleges;
- submit to the State Energy Commission maps showing all areas of the coast where, under the standards of the Coastal Act, power plants cannot be built, and update these maps every two years; and
- work to provide safe, convenient access to the shoreline.

CALIFORNIA COASTAL CONSERVANCY

California's Coastal Conservancy is a unique State agency which combines innovative techniques of land acquisition, capital improvement projects, and creation of local or private/nonprofit institutions to manage coastal resources. Often the conservancy plays the role of catalyst to motivate other agencies, landowners, and citizens groups to cooperate in completion of complex projects.

Several of the Conservancy's program areas, notably resource enhancement, urban waterfronts development, and public access directly contribute to better management and use of marine resources.

A major effort in the enhancement program is the development and implementation of Estuarine Sanctuaries and related projects. The Conservancy is the lead agency in land acquisition for the Tijuana River National Estuarine Sanctuary, southern California's largest tidally flushing estuary. Both OCZM grant monies and the Conservancy's own LCP implementation fund will be used. The Conservancy led an effort to secure $50,000 in Environmental License Plate Funds to design an interpretive center for Tijuana Estuary. Participatory workshops involving members of the education and scientific

community are being used to work out the site plan and design of facilities, which will be constructed and managed by the Department of Parks and Recreation. A third Conservancy effort in the Estuary involves the restoration of 20 acres of degraded wetland. Wetlands ecologists and volunteers fielded by a nonprofit organization are cooperating in this effort to test several restoration techniques.

In the Tomales Bay area, the Conservancy has just begun a series of community workshops to solicit ideas for specific restoration projects, and for the management of the Tomales Bay watershed. This round of work should conclude with several specific restoration activities, as well as a framework to unify the many agencies and interests operating in the area.

The Conservancy is working with the County of Marin Open Space District and the Wildlife Conservation Board on an ambitious project of land acquisition and restoration in the Rush Creek area of the Petaluma Marshes. In the Elkhorn Slough Watershed, the Conservancy is exploring ways to complement the existing Estuarine Sanctuary through acquisition of land or easements, restoration of selected areas, and erosion control on the slopes draining into the estuary.

Several projects in the urban waterfronts program benefit commercial and sport fishing. The Conservancy will participate in the restoration of the Spud Point Harbor in Bodega Bay. Fully 80 percent of the 243 berths included in this project will be allocated to commercial craft. The project has been supported by the Pacific Coast Federation of Fisherman's Association, as well as Sonoma County. Funding is provided through a partnership of the Conservancy Department of Boating and Waterways, and the Department of Parks and Recreation. Part of a larger package of viewshed protection and open space preservation projects, Spud Point implements a major recommendation of Investing for Prosperity 20 year master plan.

Another major restoration effort is the effort to rehabilitate the city-owned T-pier in Morro Bay. This project provides berthing facilities for the exclusive use of commercial boats, and represents the Conservancy's first total restoration of a pier. Local commercial fishermen, as well as the tourist industry have expressed stong support for this project.

Space for public recreational fishing is provided at both Spud Point and Morro Bay, as well as the conservancy's projects at Stearns Wharf, Santa Monica Pier, and Santa Cruz Pier. Stearns Wharf is completed and returning revenues to the City of Santa Barbara through its commercial facilities; Santa Cruz and Santa Monica are approved and proceeding through the implementation stage.

Senate Bill 1096 (Keene), approved by the Legislature during the last session, directs the Conservancy "in cooperation with the Department of Fish and Game, the Department of Boating and Waterways, the California Coastal Commission, and the Joint Committee on Fisheries and Aquaculture to prepare and submit to the Legislature a report on the adequacy of existing and planned wharfs, harbors, off loading facilities and other onshore facilities needed by the California commercial fishing industry." The report, due as an interim draft February 1, 1983, will provide the basis for updating the State's policy for assisting a priority coastal use.

On two occasions, the Conservancy has provided either funding or assistance in projects to deal with erosion threatening public beaches. The Conservancy provided $12,000 of the approximately $85,000 needed to install a Longaard tube in the City of Del Mar. The Conservancy's participation in a "rapid response" capacity enabled the demonstration of the feasibility of a 700 foot section of a coated plastic tube designed to trap beach sand with minimal cost and environmental impact. The Department of Boating and Waterways together with the Scripps Institute are monitoring the effectiveness of the tube, to help decide whether a 5,000 foot installation should be funded along the entire beach. The Conservancy also provided assistance to the City of Oceanside to obtain funding for a bypass system to stablilize coastal beaches.

The California Department of Boating and Waterways administers two programs concerning the management of marine coastal resources. These programs, which enhance and provide for improved public access to the California coastline, include the protection and stabiliztion of coastal beaches and the development of boating facilities.

As the state's recreational boating agency, the Department provides a variety of programs for the construction of boating facilities in inland and coastal areas. To meet the increasing demand for trailerable and cartop boat facilities, the Department provides grants to cities, counties and other governmental agencies for the development of boat launching facilities. These facilities are open to the public free of charge and are operated and maintained by the local agency receiving the grant.

The Department also plans and funds the development of boating facilities throughout the State Park System and on other state owned lands.

In addition, low-interest loans to cities, counties and special districts are provided for the construction and improvement of small craft harbors. Marina facilities funded by the Department can include the whole spectrum of project features from the breakwater to the public shoreline walkways. Berthing facilities can be provided for recreational as well as commercial fishing vessels. On the average, the Department appropriates more than $9 million each year for marina construction loans.

Environmental issues have played an important role with respect to the development of marinas in California. With the creation of various state and local plans and policies, the protection of wetlands, the ecology of the native habitat at a marina site, public access to the shoreline, and visual and aesthetic appearances are now important considerations in each of the Department's projects.

The California Coastal Act was designed to meet the objectives of protecting the coast as a critical natural resource and of accommodating public needs, including recreation. Boating is only one of many recreational uses of the coastal zone, yet the importance of this segment is demonstrated by the fact that recreational boating, classified along with commercial fishing, is separated from the rest of the recreational activities of the coast in the policies of the 1976 Coastal Act. Section 30224 of the Act clearly states that recreational boating use of coastal waters is to be "encouraged" through the develoopement of dry storage facilities and of public launch sites.

The California Coastal Commission and local governmental agencies have permit authority over all recreational boating facility development in the coastal zone. The Coastal Act guides development by establishing specific limits or criteria which affect the location, design and types of facilities. These criteria directly affect the parameters within which this agency and all those who would develop boating facilities can operate. These policies regulate the siting, design and use of marinas and associated structures, such as breakwaters and seawalls. They also call for the regulation of new dredging and filling, as well as maintenance dredging for existing boating facilities.

Facility development near or in wetland areas is permitted only to the extent of providing an entrance channel to a marina, or in some cases, in conjunction with restoration of a previously dredged wetland. The dredging and filling of most wetlands, estuaries, and other biologically sensitive coastal areas for marina development is not allowed. Breakwaters and similar marina-related structures must be designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Also, mitigation, such as marsh creation for disturbance of coastal areas, may be required.

The Department plans and develops its projects in accordance with criteria that have been established by other federal, state and local regulatory agencies. It also follows criteria that have been developed over the years from involvement with environmental reporting processes, permit processes, public

hearings conducted by local project-sponsoring entities, and meetings with agencies that express concerns with the environmental consequences of projects.

The second program area of the Department involves beach erosion. The erosion of California's shoreline is a serious problem confronting coastal planners. Approximately 1,500 miles of the 1,810 miles of California's shoreline are subject to erosion. Storm waves from across the Pacific Ocean as well as those locally generated are continuously eroding and reshaping the coastline. The natural erosion process has been accelerated by flood control and water development projects that have prevented the transport of sand to sustain protective beaches. The natural erosion process has also been accelerated in some instances by the installation of certain piers, breakwaters, groins, and coastal developments. These situations have caused serious damage to shoreline properties and facilities and the loss of many recreational beaches.

The Department of Boating and Waterways is designated as the public agency responsible for administering the beach erosion control program for the State of California. The Department is authorized to study erosion problems in order to improve present knowledge of oceanic forces and shoreline conditions, act as an advisor to all agencies of government, plan and construct protective works, and cosponsor the funding of local beach erosion control projects and the stabilization of beaches and shoreline areas to the extent that funds are appropriated by the Legislature.

The Department has participated in the development of virtually all of the beach erosion control projects undertaken by the federal government in California.

The Department has also developed, and now operates in cooperation with the Corps of Engineers, a unique, onsite wave data collection system that provides California with the most comprehensive coastal wave climate information of any coastline in the world.

The Department is directing its major effort in developing regional solutions for those sections of the coastline with serious erosion problems. The development of regional solutions rather than "postage stamp", site-by-site construction projects will assure that state funds are used in the most effective manner to achieve beach erosion protection objectives.

Currently, the Department's financial participation in shoreline erosion protection projects is guided by a Resources Agency policy. This policy states that coastal sections to be protected should contain substantial and valuable public-owned land or facilities of greater value than the cost of the proposed project, or the protection scheme should provide, maintain, or improve the public use and enjoyment of the beach or shoreline. The existing policy recommends that more state financial participation is justified on projects that provide a greater amount of public benefits. The key factors in determining the level of cost sharing are: public use, public access and public property.

The state does not have a public trust to protect the shoreline where the public benefits outweigh the public costs. Government has a responsibility to provide for the common good of present and future generations. Funding for beach erosion control projects is becoming increasingly scarce and these public safety projects must compete with other projects for funding.

CALIFORNIA DEPARTMENT OF FISH AND GAME

Generally, the responsibilities of the Department of Fish and Game, as defined by law, are the administration and enforcement of the Fish and Game Code (Section 702) and the laws as implemented, interpreted and made specific in Title 14 of the California Administrative Code (CAC).

To evaluate the full realm of Department responsibilities in the marine environment and the legal basis for its activities would require a detailed review of the Fish and Game Code and Title 14, CAC. However, in general terms, the Department is principally responsible for the management and protection of the State's living marine resources. The Department has also been identified under CEQA as lead agency for purposes of aquaculture review and is further identified in the Coastal Act, along with the Fish and Game Commission, as the principal state agencies responsible for the establishment and control of wildlife and fishery management programs.

Management and regulation of California's living marine resources by the Department are accomplished primarily through monitoring of fisheries and enforcement of regulations affecting the taking, possession, landing and, in some instances, marketing and transportation of marine species. Regulations include permit and license provisions, restrictions when necessary on the size, number and variety of species taken and the type, use and design of fishing gear. The Fish and Game Commission has also been delegated the authority to lease state water bottoms for aquaculture purposes and to lease specific state waters for the harvesting of kelp.

Also, it should be noted that the broad authority for the regulation of commercial fisheries has been retained by the Legislature. However, specific management responsibilities have been delegated by the Legislature to the Fish and Game Commisssion and the Department (Sections 200, 201 and numerous other code sections). The objectives which guide the Department's management and regulation of aquatic resources are generally described by policies established under Section 1700 of the Fish and Game code.

Generally, the objectives of the Department's Marine Resources Program are to maintain and enhance marine fish, plant and animal resources and to provide for the optimum harvest of these resources by sport and commercial fisheries. Studies monitor the population sizes and fluctuations of marine fish, shellfish, and plants. Investigations examine the effects of the environment and man's activities on these resources. The Department also develops techniques and assists private industry in culturing some shellfish species. Management recommendations are developed to protect marine resources and to provide for their wise use and enjoyment.

FISH AND GAME CODE:

CHAPTER 7. CONSERVATION OF AQUATIC RESOURCES

(Chapter 7 added by Stats. 1970, Ch. 88)

1700. It is hereby declared to be the policy of the state to encourage the conservation, maintenance, and utilization of the living resources of the ocean and other waters under the jurisdiction and influence of the state for the benefit of all the citizens of the state and to promote the development of local fisheries and distant-water fisheries based in California in harmony with international law respecting fishing and the conservation of the living resources of the oceans and other waters under the jurisdiction and influence of the state. This policy shall include the following objectives:

(a) The maintenance of sufficient populations of all species of aquatic organisms to insure their continued existence.
(b) The recognition of the importance of the aesthetic, educational, scientific and non-extractive recreational uses of the living resources of the California Current.
(c) The maintenance of a sufficient resource to support a reasonable sport use, where a species is the object of sport fishing, taking into consideration the necessity of regulating individual sport fishery bag limits to the quantity that is sufficient to provide a satisfying sport.
(d) The growth of local commercial fisheries, consistent with aesthetic, educational, scientific, and recreational uses of such living resources, the utilization of unused resources, taking into consideration the necessity of regulating the catch within the

limits of maximum sustainable yields, and the development of distant-water and overseas fishery enterprises.

(e) The management, on a basis of adequate scientific information promptly promulgated for public scrutiny, of the fisheries under the state's jurisdiction, and the participation in the management of other fisheries in which California fishermen are tengaged, with the objective of maximizing the sustained harvest.

(Added by Stats. 1970, Ch.88)

CHAPTER 7.2 TROUT MANAGEMENT

(Chapter 7.2 (commencing with Section 1725) added by Stats. 1979, Ch. 847)

1725. This act shall be known as the Trout and Steelhead Conservation and Management Planning Act of 1979.

(Added by Stats. 1979, Ch. 847)

1726. The Legislature hereby finds and declares that it is the policy of the state to:

(a) Establish and maintain wild trout stocks in suitable waters of the state which are readily accessible to the general public as well as in such waters in remote areas.

(b) Establish angling regulations designed to maintain the wild trout fishery in such waters by natural reproduction.

(Add by Stats. 1979, Ch. 847.)

1726.4 It is the intent of the Legislature that the department, in administering its existing wild trout program, shall conduct a biological and physical inventory of all California trout streams and lakes to determine the most suitable angling regulations for each stream or lake.

CALIFORNIA DEPARTMENT OF PARKS AND RECREATION

The California Department of Parks and Recreation owns and manages 112 diverse units on the California coast. These recreation areas, beaches, parks, reserves, and preserves encompass more than 220 miles of the state's 1,076 mile coastline.

In its land ownership and management, the Department attempts to satisfy three sometimes conflicting missions: the preservation of natural values, the preservation of cultural values, and the provision of recreational opportunities. The purpose of all three missions is to provide a wide variety of educational, recreational and inspirational benefits to the visiting public. The emphasis on preservation is strongest with preserves and reserves, while units classified as state beaches and recreation areas may be subject to considerable environmental manipulation in order to support recreational uses.

Within the context of proper resource management, the Department attempts to provide for appropriate public access to and use of the ocean waters and sea bed abutting its coastal properties. The major public uses here are recreational in nature, and include swimming, boating, snorkling, scuba-diving, nature observation, fishing, and the gathering of other wildlife, such as abalone.

Direct departmental management of waters and sea bed offshore its units is circumscribed by the fact that these areas are within the jurisdiction of other agencies. The fish and wildlife resources are under the jurisdiction of the California Department of Fish and Game. The sea bed itself - up to the 3 mile limit - is under the jurisdiction of the California State Lands Commission. As exception to the last

statement, there are 9 areas offshore Park Department units which the Commission has leased to the Department. However, these leases are of limited term and offer the Department little control over conflicting developments or activities.

In the management of offshore lands and waters for the benefit of future generations and current visitors, the Department is concerned with development which may impair such aspects as air quality, water quality, esthetics, and the maintenance of marine ecosystems, as well as the public's safety and convenience. A variety of offshore and onshore development in the areas of energy, transportation, and waste disposal pose potential threats in many units.

Jurisdiction and control in these nearshore ocean ares lies with a host of federal, state, and local governmental agencies. The Department's specific knowledge regarding many potential threats is limited, as is its staff's capacity to forsee problems and act appropriately. The Department's ability to directly bring needed changes or enforce protective measures is even more limited.

SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

The San Francisco Bay Conservation and Development Commission is a state planning and regulatory agency with regional responsibility for San Francisco Bay and the Suisun March. It administers a permit system, directly for the Bay and through local government for the Suisun Marsh.

San Francisco Bay consists of approximately 484-square miles of tidal area and approximately 1,000 miles of shoreline. Much of the shoreline is urbanized and many acres were diked-off before the Commission came into being. But there are also significant natural areas, especially in the North Bay and along the Carquinez Straits and Suisun and Honker Bays. The Suisun Marsh, administered under a separate law and plan, consists of approximately 88,000 acres of diked-off marsh mostly used for duck hunting and wildlife preserve. The Marsh with other areas in the Bay are an essential part of the Pacific Flyway.

The San Francisco Bay Conservation and Development Commission (BCDC) came into existence in 1965 as a temporary agency responsible for studying San Francisco Bay and preparing a plan to protect the Bay from uncontrolled, indiscriminate filling while also providing for the orderly growth and development of the many water-related activities that depend on the Bay. During 1966 through 1968, the Commission gathered information on all aspects of the Bay and held public hearings to hear comments on twenty-seven technical reports that discussed the major physical, social, economic and institutional aspects of the Bay. These reports led to findings and policies for the future of the Bay eventually incorporated in the San Francisco Bay Plan that the Legislature had directed the Commission to prepare. In 1969 when the Plan was submitted to the Legislature, the Commission was made a permanent state agency with regulatory authority over filling, dredging and changes of uses within all tidal areas of the Bay, a 100-foot shoreline band inland from the Bay, saltponds and managed wetlands. Later certain tributaries to the Bay were added. In the 1969 version of the McAteer-Petris Act, the Legislature adopted findings about the Bay and recognized the Bay plan as establishing state policy for the conservation and development of the Bay. Permits are issued for projects that are consistent with the McAteer Act and the Bay Plan. Inconsistent projects are not allowed.

The Commission is composed of 27 commissioners who represent various federal, state, and local agencies and the public. Five of the Commissioners are appointed by the Governor as public representatives, one Commissioner is appointed by each of the nine Bay Area Counties, four Commissioners are city representatives appointed by the Association of Bay Area Governments, and five Commissioners

are state officials, one each appointed by the Director of Finance, the State Lands Commission, the Resources Agency, the Business and Transportation Agency and the San Francisco Regional Water Quality Control Board. The Speaker of the Assembly and the Rules Committee of the Senate also each appoint a Commissioner. The District Engineer of the San Francisco District, Corps of Engineers and the Administrator for the Environmental Protection Agency, Region IX are also Commissioners but may not vote on permit matters. There are also two legislators who sit as a joint investigative committee.

Since the adoption of the San Francisco Bay Plan, much of the Commission's work concerns hearing and deciding permit applications. But the Commission also studies all aspects of San Francisco Bay. Current planning work includes the preparation, jointly with the Metropolitan Transportation Commission, of a regional port plan for the Bay, the completion of a study on diked historic baylands near the Bay that retain substantial wetland values, a study of water quality changes in Bay waters that have occurred since 1969, and a study of fresh water inflow to the Bay. There is also on-going planning concerning airport development, Coastal Conservancy in the Bay, and requests for information about the Bay and the Commission's activities.

In 1974 the Commission was assigned the task of preparing a protection plan for the Suisun Marsh, the last remaining large marsh in the State. After a two year study, the Commission presented the Suisun Marsh Protection Plan to the Legislature which enacted the Suisun Marsh Preservation Act instructing the Commission to administer the plan. This plan, unlike the San Francisco Bay Plan, does not envision significant development. Also, local governments administer permits consistent with the policies of the Marsh Plan and Act. Local governments with jurisdiction in the Marsh are also mandated to prepare local protection programs for the Marsh for Commission consideration and possible certification. To date five of the seven programs have been completed and certified. Two remain to be completed. This approach is analagous to the local coastal programs that the Coastal Commission administers.

The Commission has seven primary responsibilities. It must act on permit applications for work within or adjacent to the Bay within 90 days of the filing of an application. It must review and update the San Francisco Bay Plan by undertaking any necessary planning studies. It must act on permit applications for work within certain parts of the Suisan Marsh that are not administered by local governments and hear appeals for those portions that are administered by local governments. It must review and update, as necessary, the Suisun Marsh Protection Plan. It must review and certify or return with the reasons local protection programs prepared by local governments for the Suisun Marsh. It must review federal activities for consistency with the San Franciso Bay segment of the approved Management Program for California. It must monitor activities throughout the Commission's jurisdiction to discover any violations of BCDC plans, acts or permits and take appropriate enforcement action.

In terms of subject matter, the Bay Plan contains findings and policies on a wide variety of subjects relating to the Bay. Examples include findings and policies on fish and wildlife, marshes and mudflats, water pollution, water surface area and volume, shell deposits, climate, saltponds and managed wetlands. The Plan also contains policies regulating development in the Bay and on the shoreline for ports, water-related industry, airports, recreation, and other uses. Other policies govern filling, dredging and changing uses. The Commission's work in the Suisun Marsh parallels the Bay but with two major exceptions. The Suisun Marsh Act does not allow significant development in the Marsh and permits are to be administered by local governments.

Under the federal Coastal Zone Management Act of 1980, all federal projects and other federal activities that directly affect the Bay are reviewed for consistency with the San Francisco Bay segment of the California Management Program. BCDC's segment includes the laws, plans, regulations and similar material that govern the Bay. The Commission also reviews requests by private parties for federal approvals of projects that are in or affect coastal waters administered by the Commission. These consistency determinations and certifications are administered in a similar manner that the Coastal Commission uses for the remainder of the California Coast.

CALIFORNIA STATE LANDS COMMISSION

Public ownership of land by the state can be traced to the date of California's admission into the union in 1850. Under the "Equal Footing" doctrine, California was admitted to the union with the same rights, sovereignty, and jurisdiction as the original states. Accordingly, title to all tide and submerged lands and the lands beneath inland navigable waters was vested to the state by the constitution.

In 1938, the legislature established the State Lands Commission, successor to the office of the surveyor general, and the division of state lands in the department of finance, to manage and supervise these lands.

The Commission then became the steward of state lands. These lands consist of sovereign lands -- those which California acquired by virtue of her sovereignty-and grant lands -- those which were acquired by federal land grant. Sovereign lands include all tide and submerged lands underlying the Pacific Ocean and extending from the mean high tide line seaward for three nautical miles, and those submerged lands underlying the beds of navigable inland waterways. Grant lands include those acquired from the federal government by virtue of a legislative grant and include school lands, the 16th and 36th sections of each township or lands selected in lieu thereof, and swamp and overflowed lands. Some of the sovereign lands are also referred to as "granted lands" because the administrative control of these lands has been transferred by the legislative to local public agencies.

The Commission is composed of two elected officials, the state controller and the Lieutenant Governor; and one gubernatorial appointee, the State Director of Finance. The Commission currently is landlord for more than 4.5 million acres of land belonging to the people of the state.

The Commission is assisted by a staff of over 250 specialists in mineral resouces, land boundary determination, land management, petroleum engineering, and natural and environmental sciences. Public meetings are held each month at which interested groups may address the Commission. The Commission has pursued a philosophy that environmental concerns are paramount to the citizens of California and has demonstrated that these concerns can be successfully blended with economic considerations; all proposals for the use of state lands must have the approval of the Commission.

The California public resources code, (division 6, section 6301, et seq.), specifies the role, authorities and responsibilities of the State Lands Commission. Section 6301 provides in part:

> "The Commission has exclusive jurisdiction over all ungranted tidelands and submerged lands owned by the state and the beds of navigable rivers, streams, lakes, bays, estuaries...
>
> The Commission shall exclusively administer and control all such lands, and may lease or otherwise dispose of such lands, as provided by law..."

Pursuant to that authority, the State Lands Commission maintains management jurisdiction over all state-owned lands previously described. The Commission also exercises residual state authority, in a supervisorial capacity, over lands granted by the legislature to local government.

The Commission judiciously manages these lands under a multiple land use concept. Unlike its state agency counterparts, the Commission, as the major state landowner, is not obligated to lease, sell, or dispose of its lands. The Commision's lease considerations are geared toward the statewide public benefit from the use of such lands in a manner consistent with environmental protection and enhancement. Along with this, enabling legislation charges the Commission with the stewardship of the public trust for commerce, navigation and fisheries. The Commission, therefore, is the primary, designated custodian to protect and safeguard the public's rights pursuant to this public trust.

The Commission has, for example, exercised its trust authority, at its meeting of October 28, 1982, over approximately 160 acres of wetlands adjacent to the City of Albany in San Francisco Bay. The Commission found that it was in the public interest to preserve such lands in their natural state as an ecological unit for scientific study, open space and wildlife habitat. The area will be managed by the state Department of Fish and Game as a lessee with the Commission.

The Commission's current programs also address increasing pressures for industrial and energy development, living space, open space, wetlands preservation, recreation, and aesthetic enrichment. The daily demands for the use of state lands under the jurisdiction of the Commission include the following development requests:

A) Construction of piers, business establishments, marinas, marine terminals for oil and gas, pipelines, electrical transmission lines and roadways;
B) Channelization and dredging projects;
C) Offshore and onshore oil and gas development;
D) Salvage operations;
E) Geothermal and other alternative energy development;
F) Timber harvesting and cattle grazing;
G) Major industrial plants and thermal powerplants;
H) Mineral extraction;
I) Wetland restoration, enhancement and preservation.

The Commission authorizes and sets fees at public hearings for the use of state lands. Equitable, fair market value rental and royalty rates are assessed for use of state lands and resources. Because the uses of state lands and resources are as varied as the character of the lands themselves, the Commission has developed different approaches to setting rental rates for various types of projects in order to guarantee a fair value for the use of state lands and resources. For example, applicants for geothermal leases are generally assessed a fee based upon the percentage of developmental profits; minimum charges for pipeline rights-of-way are based on the area of required land; and additionally throughout (fees per unit of product transported) or percentage of gross income charges may be assessed for larger commercial facilities such as marine transport terminals.

The goal of the Commission's leasing and management policy is for use of land under its jurisdiction in the best statewide public interest. This goal is implemented for the lands of concern at this symposium through such programs as:

1. Protection of the public trust over the state's navigable waters, bays, sloughs, estuaries tand vital marshlands;
2. Development through leasing of state resources with environmental protection legally established through lease conditions;
3. Inspection and enforcement of State Lands Commission regulations on oil and gas operations on state lands for safety and environmental protection;
4. Staff investigations involved with the removal and marking of waterways obstructions and hazards;
5. Utilization of quality sand and gravel deposits for beach restoration;
6. Enforcement of critical safety requirements in the leases governing marine petroleum terminals;
7. Supervising and auditing legislative grants of tide and submerged lands to local governmental agencies;
8. A trespass abatement program to eliminate unauthorized uses and occupancy of state lands and resources; and
9. Protection of the public easement and trust over the state's rivers and lakes including most notably: a) Lake Tahoe; b) Donner Lake; c) the Sacramento-San Joaquin Delta Region; d) San Francisco Bay Region; e) Colorado River.

Of serious concern to the people of this state as well as to the Commission is the assurance of environmentally safe development of oil and gas resources underlying our lands. The Commission and its

staff enforce the toughest safety standards in the world for drilling and operation of oil and gas extraction. There have been no significant oil spills on state lands leases in about 40 years of operations and approximately 1,800 wells drilled.

Comprehensive policies practiced by the Commission with regard to the administration and prudent resource management of its land reflect the:

...Enforcement of strict environmental controls over all operations on state-owned lands...
...Establishment and perfection of titles to tide and submerged sovereign lands owned by the state...
...Guarantee of and provision for public access to and across lands under the state's jurisdiction...
...Determination and establishment of criteria for the optimum use of state lands
...Continuing involvement in energy and coastal-related matters, and more stringent monitoring of lands granted by the legislature to local governmental agencies.

CALIFORNIA ENERGY COMMISSION

The California Energy Commission is a regulatory agency, with authority to site power plants and set conservation standards for building and appliances. It also forecasts energy needs and works on developing new energy technologies.

The Commission is composed of five members appointed by the governor to five year terms. These members represent the fields of engineeering and physical science, environmental protection, economics, law, and the public at large. Every two years, the governor selects one of the members to chair the Commission. The Commission employs an Executive Director and a staff of about 450 to carry out its programs.

The Commission's regulatory and policy analysis responsibilities require continual assessment of current energy supply and demand patterns, and forecasts of future energy needs. Every two years, the Commission requires California's electric utilities to submit 6, 12, and 20 year forecasts of electricity demand and listing of the power plants needed to serve their customers. A common method for computing future electricity needs, developed by the Commission and used statewide, has resulted in detailed electricity demand and supply forecasts for utility service areas, and the state as a whole. The Commission's forecasting program allows comparisons of energy demand and supply factors between utility service areas, and from year to year. The Commission uses these forecasts as one basis for determining the need for new electrical facilities. Forecasts are also used to plan energy conservation programs.

Energy conservation holds the highest priority in California energy planning policies. The Commission has adopted statewide regulations which:

- Require buildings meet energy efficiency standards for design and constuction. Today we can supply the energy needs of four houses with the same energy that used to be needed for three.
- Make appliances sold in California more efficient than those generally available in other parts of the country.
- Require electronic starting devices to replace continually burning pilot lights. Previously, pilot lights consumed 10 percent of all natural gas used in the state.

Other energy conservation measures are under continual review and a comprehensive state energy conservation plan has been developed. The Commission has also adopted special measures to cope with sudden energy shortages.

Before a thermal electric plant may be constructed in California, the builder must gain certification from the Energy Commission. The facility siting certification process has two phases. The first requires an applicant submit a "Notice of Intent," proposing three alternative sites and explaining the gereration facilities. If the notice wins Commission approval, the applicant may file an "Application for Certification" seeking final approval to build at one of the sites.

The Commission reviews these notices and applications extensively at public hearing. It may take no longer than twelve months to make its decision on a Notice of Intent, and has up to 18 months to make its decision on an Application for Certification. The need for a proposed power plant, safety, utility system reliability, financial impacts, energy conservation effects, and feasible electrical generation alternatives are scrutinized in the facility siting process.

To stimulate the use of alternative energy sources, the Commission may grant exemptions from the full siting process for small, innovative power plant proposals which will generate less than 100 megawatts. California law also provides special, expedited siting review for alternative generation sources like geothermal.

California wants to develop and use renewable energy resources, and to promote environmentally sound and economically efficient energy systems. The Commission sponsors studies and demonstrations to bring solar, wind, geothermal and other promising resources into commercial use. It also conducts assessments of the technologies for fossil, hydro and nuclear energy use in California so that Commission policies and programs reflect the current state of the art.

CALIFORNIA SEISMIC SAFETY COMMISSION

The California Seismic Safety Commission was established by the Legislature in 1975 to advise the Governor, Legislature, state and local governments on ways of reducing earthquake hazards.

California has experienced more damaging earthquakes than any other state and is recognized for having the potential for more. Recognizing that some actions relating to public safety are appropriate to State government, the California Legislature created the Seismic Safety Commission for the purposes of developing public policy recommendations and programs leading to improved earthquake safety. The Commission is directing its attention to formulating goals and objectvies for seismic safety and developing programs and actions aimed at reducing the hazards that earthquakes pose to life, safety, and economic loss for the people of the State.

Seventeen Commissioners, chosen for their expertise and experience, serve without compensation. Most work is achieved through task committees of Commissioners with staff support. Public meetings are held monthly in Sacramento or other areas of the state depending on local issues. The Commission advises the Governor and the Legislature on earthquake safety and reports to them annually.

The Seismic Safety Commission has many responsibilities relating to hazard reduction:

-Advising the Governor and legislature on earthquake programs and needed legislation on seismic safety.

-Reviewing earthquake-related activities funded by the state and advising the Governor and the Legislature.
-Setting goals and priorities for reducing the earthquake hazard in the public and private sectors.
-Providing consistent policy for earthquake-related programs for agencies at all government levels.
-Proposing needed legislation and reviewing other earthquake-related legislation.
-Conducting public hearings on earthquake safety issues.
-Helping coordinate the earthquake safety activities of government at all levels.
-Recommending program changes for earthquake safety to state and local agencies and the private sector.
-Requesting state agencies to devise criteria to promote earthquake safety.
-Recommending adding, deleting, or changing state standards when such actions promote earthquake safety.
-Reviewing reconstruction efforts after damaging earthquakes.
-Gathering, analyzing, and disseminating information; encouraging research; sponsoring training.

CALIFORNIA DEPARTMENT OF BUSINESS, TRANSPORTATION AND HOUSING

The Business, Transportation and Housing Agency is a cabinet-level agency encompassing some 14 departments of state government.

This agency's most specific responsibility is to be represented by a non-voting position on the California Coastal Commission. Three areas of interest have been predominant the agency's coastal or marine involvement. First, transportation by road to and along the coast is a concern. Specific issues are most often handled by the California Department of Transportation, as one of the agency's operating departments. Second, the relationship of housing to coastal resources is a concern. Similarly, the Department of Housing and Community Development has operational responsibility for issues such as local housing plans. Finally, the agency is generally charged with representing the interest of business and economic development. This has meant that the agency will be involved in issues such as off-shore oil development, shipping and ports and industrial development.

CALIFORNIA GOVERNOR'S OFFICE OF PLANNING AND RESEARCH

OPR's primary role in marine resource management is to synthesize policy recommendations for the Governor and to coordinate statewide activities to ensure compliance with the policies. The objective is the development, coordination, and implementation of a unified marine resource management policy for the state and adoption of such a policy by the Governor and his Cabinet and by local governments where appropriate.

Working with other state agencies, local governments, and citizen groups, OPR develops the Governor's recommendations on the Department of the Interior's 5-year Oil and Gas Leasing Program, individual lease sales, and development and production plans under the Outer Continental Shelf (OCS) Lands Act. OPR also participates in litigation related to OCS development and provides staff analysis and support for oil and gas related legislation such as OCS revenue sharing proposals and measures to place a moratorium on development in designated high risk areas.

OPR's responsibility is to ensure that state and Governor's Office policies are based on a statewide perspective and that such policies incorporate the recommendations of all other state agencies with marine resource responsibilities. OPR's role in coordinating policy development of oil and gas activities is not limited to the OCS; other offshore activities such as leasing of state submerged and tide lands is also within OPR's role. OPR participates and staffs the state's Energy Coordinating Council, represents the Governor on the National OCS Policy Advisory Board and Pacific Regional OCS Policy Committee, and is a member of the Santa Barbara Petroleum Transportation Council.

OPR is directed by the California Permit Simplification Act (AB 884) to provide permit assistance which extends to marine resource management activities. When assistance is requested by potential permit applicants, OPR's role includes setting up preliminary meetings between applicants and regulatory agencies, ensuring that time limits are met, mediating disputes between agencies, and coordinating joint environmental documents. Permit assistance for offshore projects is especially important because of the complex review process, the number of agencies involved, and the potential for significant environmental damage. Serious environmental and economic losses could occur if state and local agencies, along with private industry, are not working together to develop the best possible marine resource plans.

U.S. DEPARTMENT OF COMMERCE

NOAA/NATIONAL MARINE FISHERIES SERVICE

The National Marine Fisheries Service (NMFS), as a component of the National Oceanic and Atmospheric Administration in the Commerce Department has an integrated program of research and services related to the protection and rational use of living marine resources for their aesthetic, economic, and recreational value. NMFS administers programs (1) to determine how the naturally varying environment and man's activities affect those marine resources; (2) to provide knowledge and services to foster their efficient and judicious use; and (3) to achieve domestic and international management, use and protection of living marine resources. The overall mission of NMFS is to "Achieve a continued optimum utilization of living marine resources for the benefit of the Nation."

The long-term goals of the NMFS designed to accomplish that mission are:

Goal A: CONSERVE AND MANAGE MARINE FISHERY RESOURCES FOR THE MAXIMUM BENEFIT OF THE UNITED STATES

In working toward this Goal the Service works under the broad mandate of the Magnuson Fisheries Conservation and Management Act, which extends the United States marine jurisdiction to 200 nautical miles. In conjunction with the Regional Fisheries Management Councils nation-wide, NMFS works to develop fisheries management plans within that zone, for those species of highest commercial or recreational importance. The aim is to achieve the optimum yield from the populations being managed.
Once a plan is adopted, NMFS Law Enforcement Division agents coordinate with the appropriate coastal states in monitoring and enforcing the regulatory regime outlined in that plan. In this manner the regulated fisheries may be managed for their maximum long-term economic or recreational benefits.

Goal B: MAXIMIZE THE ECONOMIC AND SOCIAL BENEFITS FROM UNITED STATES FISHERY RESOURCES BY CONTRIBUTING TO THE STABILITY AND GROWTH OF THE NATION'S FISHING INDUSTRY.

The Service works in close concert with the fishing industry to foster its vitality, improve its productivity, and expand its economic base through its Fisheries Development; Financial Services; and Seafood Quality Research, Inspection and Consumer Services Divisions. NMFS for example provides grants for fisheries development projects, analyzes and disseminates information on export and domestic market developments, manages fisheries loan guarantee and claims programs, and provides a voluntary seafood inspection and certification service to major processors.

The overall aim is to encourage economic stability and a positive climate for growth and development, so that the United States commercial and recreational fishing industries can reach their full potential for utilizing the Nation's fishery resources.

Goal C: CONSERVE POPULATIONS OF MARINE MAMMALS AND ENDANGERED SPECIES THAT ARE AFFECTED BY DOMESTIC AND INTERNATIONAL HUMAN ACTIVITES

The Service through its Office of Marine Mammals and Endangered Species conducts the research necessary to determine the status of marine mammal and endangered species stocks throughout the United States. Estimates of population levels and research are used to determine the impacts of taking marine mammals and endangered species. The NMFS is responsible for identifying and addressing issues and problems in a manner consistent with the requirements of the Marine Mammal Protection Act and the Endangered Species Act.

Issues and activities which must be addressed for their effect on marine mammals and endangered species include incidental take during commercial fishing, offshore resource exploration and development, habitat modification, private research, and public display requests. The goal of population conservation can only be achieved in the long-term, through this interaction of research and management in the decision making process.

Goal D: CONSERVE MARINE HABITATS AND ASSOCIATED ECOSYSTEMS NECESSARY TO SUSTAIN LIVING MARINE RESOURCES

The Service, recognizing that without a national advocacy for habitat conservation, maintanence of living marine resource stocks would not be feasible, addresses habitat considerations through its Office of Habitat Protection. Under the Department of Commerce responsibilities in water resources planning and development, the NMFS participates in environmental decision making by assessing the impacts of environmental alterations on habitat that is important to the maintenance of living marine resources. Operating under the Fish and Wildlife Coordination Act, the National Environmental Policy Act of 1969, the Clean Water Act, and approximately fifteen other Acts, NMFS conducts research, analyzes and makes recommendations on a wide variety of water developments, waste discharge, oil and gas activities, and other projects and permits which could adversely affect marine recreational and commercial fisheries.

The Office coordinates the habitat interests of NMFS with other state and federal agencies as well as its private commercial and recreational fishing constituency. The Office, also ensures that habitat issues are considered by all NMFS elements, so that the overall agency mission of continued optimum utilization may be achieved.

In NOAA's reorganization, the new National Ocean Service (NOS) is one of five major functional offices (e.g., the National Weather Service; the National Marine Fisheries Service; the National Environmental Satellite, Data, and Information Service; and the Office of Oceanic and Atmospheric Research). Headed by an Assistant Administrator, the NOS is the focal point for NOAA's integrated ocean services program through the activities of four major line organizations.

Within NOS the Office of Charting and Geodetic Services would be responsible for the surveys and data analysis to produce navigational charts and related information. The Office of Oceanography and Marine Services would conduct applied oceanographic research, including oceanic hard mineral and thermal energy resource analyses and tidal and wave studies, and would provide scientific response and damage assessment related to oil and hazardous spills. The Office of Marine Operations would be responsible for NOAA fleet operations and support. The Office of Ocean Resources Management (ORM) would basically be a merger of the functions of othe existing Office of Coastal Zone Management (OCZM) and the Office of Ocean Minerals and Energy (OME).

Within ORM, four major line operations have been proposed. Ocean Minerals and Energy (OME) would be responsible for administering the deep seabed mining and ocean thermal energy conversion programs, including processing license applications, and developing regulatory policies. The Sanctuary Program Office (SPO) would continue to administer financial awards to states for estuarine sanctuary development, provide policy and program guidance to states regarding estuarine sanctuary designation and management, identify and select sites for future designation as marine sanctuaries, and manage marine sanctuaries. The Coastal Programs Office (CPO) would continue to direct the state coastal zone management (CZM) and coastal energy impact (CEIP) programs, and provide technical assistance to coastal states and U.S. territories in implementing their coastal programs. The Policy Coordination Office (PCO) would be responsible for policy analysis and guidance for all ORM programs, as well as the evaluation of those programs, and for NOAA-wide policy coordination in the areas of marine transportation, outer continental shelf oil and gas development, "Superfund" and the National Contingency Plan, and coastal hazards.

The proposed reorganization has been approved by the Department of Commerce and, as of early September, is being coordinated with the Congress. It is expected to be effective by late 1982. In the interim, OCZM is proceeding to phase out Federal financial assistance for both CZM and CEIP over the next two fiscal years. Final awards are now being made to assist states in making the adjustments necessary to continue operation of their CZM programs. At the same time, Congress has under active consideration proposals to provide a share of Federal OCS oil and gas revenues to states for CZM and related programs. With or without revenue sharing, nearly all states with approved CZM programs are intent on continued implementation of the underlying laws and regulations.

After the phaseout of financial assistance, the new ORM will expand its liaison services to state CZM programs. Statutorily, ORM must evaluate programs to certify continued Federal approvability and review the implementation of the consistency provisions of the Coastal Zone Management Act. In addition, ORM will provide technical assistance and Federal agency liaison on coastal zone management issues, such as Federal consistency, natural hazards management, wetlands permitting and permit simplification, port development, urban waterfront revitalization, special area management planning and access.

The Pacific Fishery Management Council (PFMC) and seven other regional councils were created by the Magnuson Fishery Conservation and Management Act in 1976 with the primary role of developing and revising management plans for fisheries conducted within 3-200 miles off the U.S. coast. The PFMC develops plans for ocean fisheries off Washington, Oregon and California.
The Council is not a federal agency, but is an instrument of the federal government funded through the Department of Commerce. It has thirteen voting members, including the regional director of the National Marine Fisheries Service, chief fishery officials of Oregon, Washington, California and Idaho and eight knowledgeable private citizens chosen by the Secretary of Commerce from lists submitted by each governor. Nonvoting council members include the director of the Pacific Marine Fisheries Commission, regional director of the U.S. Fish and Wildlife Service, representatives of the Alaska governor's office and U.S. Department of State, and Pacific area commander of the U.S. Coast Guard. The Council has a professional staff headquartered in Portland, Oregon, a Scientific and Statistical Committee to review fishery management plans, and several fishery management plan development teams and citizen advisory panels.

A fishery management plan contains, among other things, the conservation and management measures necessary for foreign and domestic fisheries. All plans must meet seven major standards established by the Act:

- Conservation and management measures shall prevent overfishing but achieve optimum yield from each fishery;
- These measures shall be based on the best scientific information available;
- To the extent practicable, an individual stock of fish shall be managed as a unit through its range;
- Conservation and management measures shall not discriminate among residents of different states;
- The measures shall, where practicable, promote efficiency in the use of fishery resources;
- They shall take into account and allow for variations among fisheries, fishery resources, and catches;
- And where practicable, they shall minimize costs and avoid unnecessary duplication.

Fishery management plans are prepared by the council's plan development teams consisting of scientists with specific knowledge of the fishery in question. Advisory panels of knowledgeable citizens provide each plan development team with advice and perspective. Draft plans are reviewed by advisors and the scientific and statistical committee. Each plan is submitted to the public for review and comment. Public hearings are held on each plan. The council reviews all public input, adopts a plan and submits it to the Secretary of Commerce and the Coast Guard which are charged with enforcement of the regulations.

The Council has developed plans for the ocean salmon, groundfish and anchovy fisheries.

U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

Regarding the Bureau of Land Management's role in marine resources management, its responsibilities, and its legislative mandate: With exception of the offices involvement in the custodial management of some one thousand acres of over a thousand reefs, islets, pinnacles, and small islands off the coast, the Bureau is not involved in marine resources management. Its role centers around the management of over 16.5 million acres of public land in California. These are managed for a myriad of uses including recreation, wilderness, wildlife, watershed, grazing, minerals and timber. The basic charter for managing these lands is found in the Federal Land Policy and Management Act. Its passage in 1976 established the national policy that the public lands were to be retained in Federal ownership and managed for multiple-use and sustained yield. The Act repealed some 300 archaic land laws and formalized in law the completion of BLM's evolution from land agent to full multiple-use manager of the public lands.

The Bureau does have management responsibility for some 240 miles of salmon and steelhead spawning, nursery and resting habitat. Its role to date has been mostly custodial with the exception of involvement in salmon and steelhead habitat improvement over the past three years. This work has been centered in the King Range National Conservation Area (Mendocino County) and the Trinity River Basin (Shasta County). The Bureau has also maintained a custodial role with respect to the reefs, islets, pinnacles and small islands of the California coast. Primary responsibilities for managing these areas has been with the California Department of Fish and Game under a 1978 Cooperative Agreement.

BUREAU OF MINES

The Western Field Operations Center (WFOC) of the U.S. Bureau of Mines is not involved with the management of ocean mineral resources, nor does it have any regulatory, leasing or administrative responsibilities.

Its concern with ocean mineral deposits is of a scientific nature--the Western Field Operation Center has been involved in evaluation of deep-ocean polymetallic nodule deposits since 1975. Among other reports, WFOC has recently completed a draft report entitled "Manganese Nodule Resources of Three Areas in the Northeast Pacific Ocean: With Proposed Mining-Beneficiation Systems and Costs." WFOC is currently evaluating several phosphorite deposits off-shore from Southern California, and has proposed to do some preliminary evaluations of sand and gravel deposits off-shore from Los Angeles, California; Oahu and Molokai, Hawaii; and the south Washington coast. Other proposed work consists of mineral data collection and analysis relating to submarine massive sulfides and manganese nodule deposits. WFOC is also concerned with outer continental shelf (OCS) hard-rock mineral deposits; most specifically, data collection and analysis of strategic and critical mineral commodities such as chromite, tin, gold, platinum, and titanium.

The Fish and Wildlife Service has responsibilities in the coastal and marine environment arising from laws, treaties, Executive Orders, and related interdepartmental agreements. Some of these are the fish and Wildlife Act of 1956, the Fish and Wildlife Coordination Act, Memorandum of Agreement between the Secretary of the Interior and the Department of the Army, July 2, 1982, the National Environmental Policy Act (P.L. 91-90), and the Endangered Species Act to name just a few.

The Fish and Wildlife Coordination Act (Act of March 10, 1934, 48 Stat. 4017 as amended, 16 U.S.C. 661-66c) states among other things:

> "Whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the United States, or by any public or private agency of the United States, or by any public or private agency under Federal permit or license, such department or agency first shall consult with the United States Fish and Wildlife Service, Department of the Interior, and with the head of the agency exercising administration over the wildlife resources of the particular State wherein the impoundment, diversion, or other control facility is to be constructed, with a view to the conservation of wildlife resources by preventing loss of damage to such resources as well as providing for the development and improvement thereof in connection with such water-resource development." (Emphasis added)

When this is read in conjunction with the Fish and Wildlife Act of 1956, Declaration of Policy, which in essence states:

> The Congress hereby declares that the fish, shell fish, and wildlife resources of the Nation make a material contribution to our national economy and food supply, as well as a material contribution to the health, recreation, and well-being of our citizens: such that resources are a living, renewable form of national wealth that is capable of being maintained and greatly increased with proper management, but equally capable of destruction if neglected or unwisely exploited; that such resource afford outdoor recreation throughout the Nation and provide employment, directly or indirectly, to a substantial number of citizens; and that properly developed, such fish and wildlife resources are capable of steadily increasing these valuable contribuitions to the life of the Nation.

Wildlife must be understood in its broadest sense; that is, all mammals, birds, fish (including mollusks and crustaceans) and other classes of wild animals and all types of aquatic and land vegetation upon which they are dependent.

The Endangered Species Act (16 U.S.C. #1531-1543) and specifically Section 7 is critical to all Federal agencies and their respective actions. Section 7 of the Act reads:

> The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this chapter. All other federal departments and agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this chapter by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 1533 of this title and by taking such action necessary to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of such endangered species and threatened species or result in the destruction or modification of

habitat of such species which is determined by the Secretary, after consultation as appropriate with the affected States, to be critical.

The literal meaning of this section is quite clear. All Federal agencies and departments shall insure that activities authorized, funded or carried out by them do not jeopardize listed species and/or result in the destruction or adverse modification of habitat designated by the Secretary of the Interior as Critical Habitat for endangered species. Anything short of such a guarantee fails to satisfy an agency's responsibilities under Section 7.

The Service had consistently maintained that numerous activities and their resultant habitat modifications can conceivably take place within critical habitat without conflicting with Section 7. A consistent reading of the Section is that habitat modifications per se are not prohibited, but only those modificaitons which diminish the value of the habitat for a listed species. Manipulation of habitat to the clear benefit of a listed species is permissable. A Section 7 consultation with the Fish and Wildlife Servie is required before a permit is issued for an activitiy that may affect a threatened or endangered species.

The National Environmental Policy Act is the Nation's basic national charter for protection of the environment. This Act declares an national policy that encourages productive and enjoyable harmony between man and his environment to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation;

Section 102(c) of the Act indicates that all agencies of the Federal government shall:

"Include in every recommendation or report on proposals of legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on--

(i) the environmental impact of the proposed action,
(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
(iii) alternatives to the proposed action,
(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented."

Each one of these items is important and must be carefully considered for any project. Of importance are the cumulative effects of various projects.

Each action or project, while a small matter in itself, and with seemingly minor impact, can collectively over a period of years have a major impact on limited resources.

The overall objective of the Fish and Wildlife Service is to preserve and protect resources, habitat and public trust rights in and associated with the Nation's waters by minimizing development or use impacts and degradations; helping to restore or improve habitat and associated resources and providing opportunities for public use and enjoyment through proper development and management.

The Service responds to activities being proposed by specific project legislation, and to permit applications under Section 10 of the River and Harbor Act of 1899, Section 402 and 404 of the Clean Water Act and Section 103 of the Ocean Dumping Act.

In the overall effort to manage the Nation's fish, wildlife and aquatic resouces, the Fish and Wildlife Service exercises and encourages all efforts to preserve, restore, and improve the fish, wildlife, and naturally functioning aquatic and wetland ecosystems and their adjacent lands.

a. The Service reviews, investigates, and cooperates by providing ecological advice on the formulation of Federal and federally permitted and assisted plans for development of the Nation's waters and adjacent lands.
b. The Service prepares reports, comments and recommendations on proposals for Federal and federally permitted or assisted developments which encroach upon the Nation's waters.

c. The Service provides technical guidance and assistance to government agencies and concerned citizens on the environmental aspects of managing waters, wetlands and associated resources. The development and adoption of comprehensive regional and statewide plans for the management of such waters and wetlands is encouraged.
d. The Service encourages and provides technical guidance and assistance to local and state programs and conducts training sessions (wetland identification and coastal ecosystem profiles designed to further public education and awareness of environmental values and threats to the Nation's waters, wetlands and associated resources).

e. The Service encourages early consultation of any activity which could impact threatened or endangered species or their habitat or any activities which could adversely impact the renewability of the Nation's waters and associated resources.

MINERALS MANAGEMENT SERVICE

After establishing the Minerals Management Service (MMS) in January, 1982, focusing on mineral royalty management onshore, the Secretary of the Interior expanded MMS by incorporating all leasing and resource management functions for the Outer Continental Shelf (OCS) program.

The OCS program, as stated by the Department and viewed in the context of National Energy Policy, is to encourage and permit discovery, identification, and to inventory those mineral resources that lie beneath the ocean within Federal jurisdiction, and to allow for their timely and efficient development while simultaneously protecting the environment.

The offshore function of MMS, with four regional offices, uses the Department's five-year OCS Oil and Gas Leasing Schedule as its basic planning tool which provides for consideration of leasing (4 lease sales offshore California) in all OCS Planning Areas with oil and gas potential.

The Pacific OCS Regional Office, in support of the five-year Schedule, is responsible for the leasing and supervision of industry operations on submerged lands on the Federal OCS for exploration, development, and transportation of all mineral resources offshore California, Oregon, Washington, and Hawaii. Specifically, the Office implements the MMS Environmental Studies Program, prepares environmental analyses (Appraisals and Impact Statements) with public input and participation, issues permits for pipeline right-of-way, and conducts Lease Sales.

Presently the regional office is comprised of personnel and associated functions from the previous Conservation Division, U.S. Geological Survey, and the Bureau of Land Management's Pacific OCS Office. A draft organizational structure for the new regional office is before the Director of MMS with approval and/or modification expected in the near future.

U.S. DEPARTMENT OF TRANSPORTATION

U.S. COAST GUARD 11TH DISTRICT

The United States Coast Guard as a Federal agency has many varied responsibilities and objectives which fit into the realm of marine resource management. The majority of these responsibilities can be separated into the general categories of commercial and recreational vessel safety, environmental protection and response, waterways management and the enforcement of laws and treaties. Many of the Coast Guard's individual roles in marine resource management fit into more than one of these general categories concurrently.

The Coast Guard's responsibilities in recreational and commercial vessel safety relate to the prevention of the loss of life and property at sea. The Recreational Boating Safety Program performs three primary functions: enforcement of construction and performance standards, education of the boating public and the enforcement of boating safety laws. This program was mandated by a series of Federal Boating Safety Acts. The commercial Vessel Safety Program dates from the early 1800's when the introduction of steam propulsion on vessels was accompanied by catastrophic accidents. Its modern functions include: review and approval of plans for vessel construction and alteration, inspection of vessels and offshore facilities, the licensing and certification of merchant marine personnel, and the investigation of marine casualties and matters involving merchant marine personnel.

The environmental protection and response roles are relatively new functions in the overall history of the Coast Guard. The Federal Water Pollution Control Act of 1972, as amended, and the Comprehensive Environmental Response, Compensation and Liability Act (1980) are two of the key laws governing marine environmental protection. This program encompasses the prevention and detection of discharges of oil and other hazardous substances into the environment. The Coast Guard along with the Environmental Protection Agency assures that when such spills do occur, they are cleaned up wherever possible and proper penalties are assessed.

The objectives of the Waterways Management Program are to safeguard persons, vessels and the marine environment in the nation's ports, waterways and offshore approaches by utilizing a broad range of vessel traffic management techniques. The foundation of this program is the Ports and Waterways Safety Act of 1972 as amended. Some of the techniques available to accomplish the objectives of this program are the establishment of vessel traffic services, traffic separation schemes and safety fairways and the promulgation of specific regulations regarding vessel equipment and operations. This program works closely with the aids to navigation function which is responsible for the establishment and maintenance of over 46,000 short range aids to navigation and the issuance of various Notice to Mariners.

Probably the most complex of the Coast Guard's responsibilities in marine resource management is that of the enforcement of laws and treaties. For nearly 200 years the Coast Guard has been the principal Federal agency for maritime law enforcement upon U.S. waters and on the high seas. Throughout the Coast Guard's history this program has shifted emphasis in response to changing national demands. The current areas of emphasis include maritime drug interdiction and the enforcement of fisheries conservation regulations. Under the Fisheries Conservation Management Act the Coast Guard, along with NOAA, has the responsibility for enforcing domestic and foreign fisheries regulations for the purpose of conservation and management. In this program, more than in any of the other marine resource management programs, the Coast Guard works with and relies upon many other Federal and state agencies to accomplish its objectives.

These four programs represent the balance of the Coast Guard's responsibilities in terms of marine resource management but nearly all of its programs could have been included to a certain degree. Marine resource management has always been and will continue to be one of the key areas of Coast Guard concern.

The history of the Coast Guard goes back nearly two centuries to the beginning of the United States when, in 1789, the first Congress passed an act calling for the collection of customs duties on imports and tonnage. To enforce these new customs regulations, Congress approved an act the following year that created the Revenue Marine, later renamed the Revenue Cutter Service, and forerunner of the modern day Coast Guard. Since its creation, the Revenue Marine was called upon to enforce additional regulations, including the enforcement of immigration laws (1862), and protection of the fisheries (1885). Between 1920 and 1934, the Coast Guard faced a major law enforcement challenge in enforcing Prohibition laws forbidding illegal liquor traffic. These early law enforcement duties established much of the broad law enforcement authority that the Coast Guard currently possesses.

The duty that is most commonly associated with the Coast Guard -- saving those in peril at sea -- is also deeply rooted in the Nation's history. As early as 1799 Revenue Cutters were dispatched to render assistance to vessels in distress, and in 1831 the first winter cruises were ordered to routinely provide aid during gale season. In 1848 Congress laid the foundation for the U.S. Lifesaving Service, when it authorized funds for the establishment of the first shoreside rescue stations along the coast. Over the ensuing years, a system of lifesaving stations was created which included the Atlantic, Pacific, and Gulf Coasts and the Great Lakes.

In 1915, Congress merged the Revenue Cutter Service and the Lifesaving Service to create the Coast Guard, combining two of the Service's most important mission areas -- law enforcement and search and rescue -- and establishing the multi-mission operations that are integral to today's Coast Guard.

In every war since its creation the Coast Guard and its Predecessor agencies have served with distinction. As early as 1797 during the Quasi-War with France, when no standing Navy existed, Congress authorized the President to use Revenue Cutters for naval defense. In 1799, Congress allowed for Revenue Cutters to become part of the Navy in time of war, an arrangement that continues with today's Coast Guard. Revenue Cutters subsequently served in the War of 1812, the Civil War, and Spanish-American War.

In both World Wars the Coast Guard was transferred from the Treasury Department to the Navy. During World War I Coast Guard cutters played a major role in convoy escort. In World War II, the Coast Guard expanded from 17,000 personnel at the outbreak, to a peak of over 175,000 in order to carry out a wide range of world-wide naval missions, including antisubmarine warfare, amphibious operations, port security, ocean stations, as well as traditional peacetime activities. During the Korean Conflict the Coast Guard again mobilized to provide assistance to the Navy.

During the Vietnam war the Coast Guard provided a squadron of five large cutters and 27 patrol boats to support Navy efforts to interdict gun smuggling and to provide naval gunfire support. Coast Guard units also provided aids-to-navigation and LORAN-C services, and supervised explosive loadings on merchant vessels within the combat zone.

Prior to World War II the Coast Guard acquired two of its major peacetime duties. In 1939, Congress transferred the U.S. Lighthouse Service from the Commerce Department to the Coast Guard. Since then, the Coast Guard has managed the Nation's system of maritime navigaiton aids. Also in 1939, the Bureau of Marine Inspection and Navigation was transferred to the Coast Guard, making the Coast Guard responsible for the inspection of U.S. merchant vessels to insure seaworthiness, licensing and certification of U.S. merchant marine personnel, and investigation of major maritime casualties.

In recent years, the Coast Guard has continued to experience changes in missions, mostly in the form of new responsibilities authorized by the Congress. Passage of the Bartlett Act of 1964 expanded enforcement of U.S. fisheries laws within the 12-mile limit. The Magnuson Fishery Conservation and Manage-

ment Act of 1976 expanded fisheries enforcement further by creating the 200-mile fishing zone and giving the National Marine Fisheries Service and the Coast Guard broad enforcement over both foreign and domestic fishermen.

Since 1962, Coast Guard search and rescue activities have doubled due primarily to a steadily increasing recreational boating population. During the 1970's an increase in illegal drug smuggling by sea led to additional interdiction efforts by the Coast Guard. In 1973 the Coast Guard seized six marijuana-laden vessels; in 1981 it seized 164 vessels. Recent increases in illegal alien immigration by sea have also resulted in additional Coast Guard activity to enforce the immigration laws.

During the last decade, increasing public concern for the protection of the environment has prompted legislation increasing Coast Guard activities in port and environment safety, commercial vessel safety, and marine environmental response. Some of the more notable mandates are: the Water Quality Improvement Act, the Federal Water Pollution Control Act, Ports and Waterways Safety Act of 1972, Deepwater Port Act, Outer Continental Shelf Lands Act and the Port and Tanker Safety Act of 1978.

During this same period the Coast Guard was able to reduce operations in other mission areas. Technological improvements allowed for the Coast Guard to discontinue the Ocean Station program in the early 1970's, reduce the number of its buoy tenders from 125 in 1969 to 87 in 1981, eliminate all but one lightship station, and phase out the entire LORAN-A radionavigation chain.

The net result of these changes in Coast Guard missions during the last decade has been an increase in regulatory duties. Historically, the Coast Guard had been primarily a seagoing agency, relying on ships, boats and aircraft to carry out operational maritime missions such as search and rescue and law enforcement on the high seas. This operational priority continues, but additional regulatory responsibilities have caused shift of personnel to regulatory duties such as commercial vessel safety and marine environmental protection. A result of this shift of emphasis has been a decrease in the number of Coast Guard cutters from 339 in 1969, to 248 in 1981, and aircraft from 174 to 154.

At the end of Fiscal Year 1981 the Coast Guard consisted of approximately 39,000 military and 5484 civilian personnel. A major element of the Coast Guard is the Reserve Training Program providing an additional resource of over 22,000 personnel, nearly 12,000 of whom are in the Selected Reserve.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

FOOD AND DRUG ADMINISTRATION

The Food and Drug Administration (FDA) is a component of the Public Health Service within the U.S. Department of Health and Human Services. The Commissioner of the Food and Drug Administration reports to the Secretary of Health and Human Services through the Assistant Secretary for Health.

FDA is a scientific regulatory agency dedicated to assuring public health and safety. Its mandate is consumer protection. FDA's mission is based on the premise the consumer cannot adequately assess the safety and effectiveness of foods, drugs, and other products because of the complex nature of manufacturing and distribution systems in this country.

The agency's goals are to ensure that food is safe and wholesome; drugs, biological products, and medical devices are safe and effective; cosmetics are safe; use of radiological products does not result in unnecessary exposure to radiation; and all of these products are accurately labeled.

FDA's line organizations are the product-oriented bureaus for food, drugs, biologics, veterinary medicine, radiological health, and medical devices, the field organization coordinated by the Executive Director for Regional Operations (EDRO), and the highly specialized National Center for Toxicological Research (NCTR).

Through the Bureau of Foods the agency is involved in regulating the food industry to assure they are in compliance with federal laws and in the simplest of terms, that food is safe, wholesome, produced under sanitary conditions, and the products are honestly and informatively labeled. FDA's responsibility for foods covers essentially all food shipped or received in interstate commerce except meat and poultry products, which are regulated by the U.S. Department of Agricuture (USDA). The seafood industry falls under FDA's authority. Although FDA has no direct control over marine resource management, it has a vital interest in pollution effects on food resources such as fish and shellfish, due to the potential public health problems which can result from the consumption of contaminated seafood.

The primary hazard to the consumer from shellfish relates to the quality of the waters in their growing areas. Shellfish pump and filter vast quantities of water through their bodies as an essential part of their life process, and will accumulate and concentrate micro-organisms, chemicals (pesticides), and heavy metals such as mercury from their marine environment. If they are exposed to water polluted with human and animal wastes, they may become agents of diseases such as cholera, typhoid, hepatitis, and other gastronenteric diseases.

Since people frequently eat raw or partially cooked shellfish, a health hazard may be present if shellfish are havested from contaminated waters. Even in cases where shellfish are fully cooked the presence of chemicals or naturally occuring marine biotoxins associated with paralytic shellfish poisoning (PSP) may result in shellfish poisonings.

FDA specifically assists the states with their programs for shellfish safety by participation in the National Shellfish Sanitation Program (NSSP), a voluntary tripartite organization consisting of the participating state regulatory agencies, the shellfish industry, and FDA. The agency develops, supports, and evaluates the effectiveness of standardized state and foreign shellfish sanitation control programs. FDA also has many other program responsibilities including development of new standards, research, providing technical assistance, and training for federal and state shellfish personnel.

Local and state agencies approve shellfish growing areas and handling plants in accordance with NSSP guidelines. Shellfish shippers awarded operating certificates by a state receive an identifying "certified" number which must be placed on every container of fresh or frozen oysters, clams, or mussels.

State agencies classify growing areas as to their safety for shellfish harvesting and have the power to close these areas if pollution, paralytic shellfish poisoning or other health hazards occur. They may also embargo and destroy any polluted, hazardous, or uncertified shellfish.

FDA is concerned that the seafood industry has a wholesome product for sale to the consuming public, and its authority for enforcing this derives from the Federal Food, Drug and Cosmetic Act and the Public Health Service Act's Interstate Quarantine Regulations. Through routine and special sampling programs FDA monitors the potentially hazardous materials that may be present in these foods due to pollution of their environment or concentration of hazardous materials through the food chain. Since most of the hazardous materials are a result of a man's impact on the environment FDA must be concerned with pollution control and the effects of pollution on food sources.

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

During the Coastal Commission's first ten years, the major planning issues in California focused on land-based coastal resources. HUD maintained an interest in these issues although not a direct involvement. The basic responsibility for land use decisions, relating to the use of HUD program resources, rests with local government. Now that Local Coastal Plans are nearing completion, the focus has shifted to issues involving marine resource management. HUD program activities usually have no bearing on such issues.

The above is not meant to suggest that HUD feels no responsibility in coastal zone matters. As a Federal agency, it must comply with the provisions of the Coastal Zone Management Act. In it Housing Programs this responsibility is met by assuring that project proposals comply with the state's coastal zone management programs. HUD has rarely experienced difficulty in meeting this responsibility because housing projects are normally designed to comply with the requirements of the Local Coastal Plan--before they are submitted to the Department. In the case of the Community Development Block Grant Program, responsibility for compliance with the Act has been delegated to the grantee. Under the State-Administered Small Cities Program, grantees will retain responsibility for compliance.

FEDERAL MARITIME COMMISSION

The Federal Maritime Commission regulates the waterborne foreign and domestic offshore commerce of the United States, assures that United States international trade is open to all nations on fair and equitable terms, and protects against unauthorized, concerted activity in the waterborne commerce of the United States. This is accomplished through maintaining surveillance over steamship conferences and common carriers by water; assuring that only the rates on file with the Commission are charged; approving agreements between persons subject to the Shipping Act, 1916; guaranteeing equal treatment to shippers, carriers, and other persons subject to the shipping statutes; and ensuring that adequate levels of financial responsibility are maintained for indemnification of passengers and clean-up of oil and hazardous substances spills.

The Commission administers the vessel certification provisions of section 311 (p)(1) of the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (91 Stat. 1566), section 204(c) of the Trans-Alaska Pipeline Authorization Act (87 Stat. 584), and section 305 (a)(1) of the Outer Continental Shelf Lands Act Amendments of 1978 (92 Stat. 670) with respect to evidence of financial responsibility required from operators of vessels which may be subjected to liability for damages and removal of oil and hazardous substances discharged into United States waters.

In clarification of responsibilities for Water Pollution, although the Commission is charged with issuing upon application Certificates of Financial Responsibiltiy to vessel operators under the Federal Water Pollution Control Act, the Trans-Alaska Pipeline Authorization Act, and the Outer Continental Shelf Lands Act, the enforcement responsibility for these three is lodged with the US Coast Guard and US Customs Bureau Commission issued rules on these three acts may be found at 46USC 542, 543, and 544.

The Commission also oversees lease arrangements of existing facilities and to some degree operations of port and terminal operators whose facilities are used by ocean-going common carriers.

Appendix F

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Appendix G

LIST OF POLICY PAPERS

Seventy-five policy papers were prepared for presentation at the Ocean Studies Symposium. Abstracts of the papers were distributed to the participants. Since Symposium presentations were limited to five minutes, authors of the papers covered only the highlights of their subjects. The full text of the policy papers are contained in the second volume of this report, OCEAN STUDIES SYMPOSIUM/POLICY PAPERS.

OCEAN STUDIES SYMPOSIUM/POLICY PAPERS may be ordered from the California Coastal Commission at the cost of $25.00, including taxes and postage. An order form is included for convenience at the end of this section. Please allow six to eight weeks for delivery.

A list of the policy papers follows.

LAW OF THE SEA/NATIONAL ROLE IN OCEAN MANAGEMENT

Are There Workable Principles for Managing the Resources of the Deep Seabed?, Ronald S. Katz, Gaston Snow & Ely Bartlett, Palo Alto, CA

Allocation of Federal and State Authority for the Management of Living Marine Resources, Eldon V. C. Greenberg, Galloway and Greenberg, Washington, DC

State Versus National Interests in an Expanded Territorial Sea, Robert W. Knecht and William E. Westermeyer, Woods Hole Oceanographic Institution, Woods Hole, MA

Opportunities for a State-Federal Partnership in an Expanded Territorial Sea, Michael E. Shapiro, Califronia Energy Commission, and Rosella W. Shapiro, Governor's Office of Planning and Research, Sacramento, CA

Reflections on the Failure of NOAA's Ocean Management Office, by Samuel A. Bleicher, Blank, Rome, Comiksy and McCauley, Washington, DC

AQUACULTURE

The Value and Proposed Management of Seaweed Resources in California, Dr. Judith E. Hansen, Marine Bioassay Laboratory, Watsonville, CA

Coastal Aquaculture: Management Issues, Gerald D. Bowden, Atchison & Anderson, Santa Cruz, CA, for the West Coast Aquaculture Foundation, Monterey, CA

Aquaculture in Humboldt Bay: Past, Present and Future, Dr. William N. Shaw, Telonicher Marine Laboratory, Humboldt State University, Humboldt, CA, and Ronald W. Warner, California Department of Fish and Game, Eureka, CA

Kelp Harvesting and State Organizational Structures for the Management of Living Marine Resources, Don E. Conner and Ronald H. McPeak, Kelco Division of Merck and Company, San Diego, CA

Aquaculture and Coastal Zone Planning, Dr. Fred S. Conte and A. T. Manus, University of California, Davis, CA

Prospects for the California Abalone Resource: Recent Development of New Technologies for Aquaculture and Cost-Effective Seeding for Restoration and Enhancement of Commercial and Recreational Fisheries, Dr. Daniel E. Morse, University of California, Santa Barbara, CA

Advent of Open Ocean Ranching of Abalone on a Basis Benefitting the State of California, Commercial Fisheries, Recreational Fisheries and Private Enterprise, Lad Handelman, California Sea Farms, Inc., Santa Barbara, CA

COMMERCIAL AND SPORT FISHERIES

California Policy and Management for Natural Pacific Salmon Production, Dr. David G. Hankin, Humboldt State University, Arcata, CA

Populaton Genetics, Salmon Production and Management of the Fishery, Dr. Graham A. E. Gall and Paul G. Olin, University of California, Davis, CA

Fishermen: Champions for Priceless Resources, Stephanie R. Thornton, Humboldt Fishermen's Marketing Association, Eureka, CA

Imminent Technological Developments in Satellite Remote Sensing and Hydroacoustic Fish Assessment and Their Effect on Fishermen and Fisheries Management Agencies, Robert R. Abbott, Tiburon Center for Environmental Studies and Paul Sund, National Marine Fisheries Service, Tiburon, CA

Toward Sharing the Coastal Seas: Commercial Fishing and Marine Geophysical Surveys, Thomas L. Wright, Chevron, USA, Concord, CA

Is There a Role for the Coastal Commission in the Management of Northern California's Commercial Fisheries?, Dan Ray and Bruce Fodge, California Coastal Commission, and Christopher Toole, Marine Advisory Extension Service, Eureka, CA

The Role of the Calfornia Cooperative Oceanic Fisheries Investigations in Fisheries Research and Management, Dr. Rueben Lasker, CalCOFI Coordinator, University of California, La Jolla, CA

MARINE MAMMALS

The Perils of Success: Implications of Increasing Marine Mammal Populations in the Southern California Blight, Dr. Charles F. Cooper, San Diego State University, and Brent S. Steward, Hubbs/Sea World Research Institute, San Diego, CA

The Southern Sea Otter Mapping Project: Implications for the Management of California's Nearshore Resources, James A. Dobbin and Michele H. Lemay, Dobbin Associates, Washington, DC

Dynamic Response Estimation of Population Status Relative to Maximum Net Productivity Level, Dr. Daniel Goodman, Scripps Institution of Oceanography, La Jolla, CA

Relationships of Sea Otters to Living Marine Resources in California: A New Perspective, Dr. Glenn R. VanBlaricom, U.S. Fish and Wildlife Service, San Simeon, CA

An Inventory of Marine Mammals and Seabirds Along the California Coastline, Dr. Thomas P. Dohl, University of California, Santa Cruz, CA

The Potential for a West Coast Stranding Network for Marine Mammals, Dr. Leslie A. Dierauf and Marc A. Webber, California Marine Mammal Center, Sausalito, CA

Biological and Management Considerations for Cetaceans in Coastal Waters of California, Ronn Storro-Patterson, The Whale Center, Oakland, CA

MARINE SANCTUARIES, UNDERWATER PARKS AND REFUGES

The State Department of Parks and Recreation: Its Role in the Marine Environment, Charles Mehlert, Department of Parks and Recreation, Monterey, CA

The Role of Parks and Sanctuaries in Multiple Use Management of Coastal Resources, Gary Davis and Carol Pillsbury, Channel Islands National Park and Marine Sanctuary, Ventura, CA

Establishment of Marine Sanctuaries, Maxine McCloskey, The Whale Center, Oakland, CA

Marine Recreational Conflicts in the Nearshore Marine Environment, Neils West, University of Rhode Island, Kingston, RI

OFFSHORE ENERGY AND MINERAL RESOURCES AND INDUSTRIAL ACTIVITIES

Soil Machine Interaction Studies for Mangenese Nodule Mining, Dr. Iraj Noorany, San Diego State University, and John Fuller, Western Nuclear, Inc., Lakewood, CO

Petroleum in California's Oceans, Dr. Dale Straughan, Dale Straughan International, Paramount, CA

OCS Well Information Related to Resource Estimation, Geologic Hazards, Evaluation, Environmental Risks and Future Exploration Opportunities in Frontier Basins Offshore California, D. L. Ziegler, Chevron, USA, Concord, CA

Subsea Production Systems and Completions, J. B. Hundley, ARCO Oil and Gas Company, Bakersfield, CA

Salient Features in Developing Management Strategy to Assess the Effects of Offshore Drilling Fluids and Cuttings, Dr. Don Maurer, Southern California Ocean Studies Consortium, Long Beach, CA

Santa Barbara Channel Natural Oil and Gas Seep Containment Project, Dr. Robert A. P. Gaal, State Lands Commission, Long Beach, CA

Offshore Oil Spill Equipment Evolution in Southern California: A Federal Perspective, Commander L.A. Onstad, U.S. Coast Guard, Long Beach, CA

Dam-Atoll for Concentration and Conversion of Ocean Wave Energy, Thomas P. Higgins and Clinton P. Sherburne, Lockheed Missiles and Space Company, Sunnyvale, CA

The Future of Ocean Mining Industry in the State of California: Management and Planning Decisions, Kurt M. Shusterich, Woods Hole Oceanographic Institution, Woods Hole, MA

Management Alternatives for Disposal of Marine Mineral Processing Wastes Along the California Coast, Patrick A. Kennedy, Rogers, Golden and Halpern, Philadelphia, PA

Ecological Research for Offshore Oil Extraction, Dr. Robert B. Spies, Lawrence Livermore National Laboratory, Livermore, CA

MARINE POLLUTION

How Much Protection Does the Marine Environment Need and Deserve?, Kenneth S. Kamlet, National Wildlife Federation, Washington, DC

Deciding on a Proper Ocean Disposal Policy, Willard Bascom, Coastal Water Research Project, Long Beach, CA

The Ocean Disposal of Radioactive Waste: International Law and California, David D. Caron, University of California Law Student, Berkeley, CA

Multi-media Sewage Sludge Management: The Role of the Ocean in California, Douglas A. Segar and Elaine Stamman, SEAOcean, Inc., Wheaton, MD

Assessing the Impact of Toxic Waste Disposal in California Coastal Zone, Dr. Michael Martin and Mark D. Stephenson, Department of Fish and Game, Monterey, CA

Marine Pollution Protection is the Answer But What are the Questions?, Dr. David W. Fischer, University of West Florida, Pensocola, FL

Crustaceans as Biomonitors: Variation in Egg Production Among San Crabs Living Near a Power Plant, Adrian M. Wenner and Paul Siegle, University of California, Santa Barbara, CA

MARINE TRANSPORTATION

Marine Transportation and Coastal Policy, Peter A. Johnson, Office of Technology Assessment, U.S. Congress, Washington, DC

Offshore Oil versus Vessel Navigation: Resolving the Conflict, Lt. Commander Jan E. TerVeen, U.S. Coast Guard, Long Beach, CA

The Benefits and Costs of a Vessel Traffic Control System for the Santa Barbara Channel, Arent H. Schuyler, Jr., University of California, Santa Barbara, CA

SHORELINE EROSION

Ocean Circulation in California Coastal Waters, Professor Christopher Mooers, Naval Postgraduate School, Monterey, CA

Processes of Beach Erosion Along the Oregon and Northern California Coastlines, Dr. Paul D. Komar, Oregon State University, Corvallis, OR

The Case For/Against Coastal Protection, Dr. Gary B. Griggs, University of California, Santa Cruz, CA

Beach Changes and Sediment Budgets Along the Ventura County Coast, Antony R. Orme and Amalie Brown, University of California, Los Angeles, CA

Data Needs for Shoreline Erosion Planning, Richard J. Seymour, Department of Boating and Waterways, La Jolla, CA

"The Coast of California Storm and Tidal Waves Study" as a Prototype Coastal Resources Study, Daniel Muslin and Jan Devine, U.S. Army Corps of Engineers, Los Angeles, CA

The Regulation of Shoreline Stuctures, William Allayuad, California Coastal Commission, Santa Cruz, CA

Oceanside, CA, Sand Bypass Experiment, Carl Enson, U.S. Army Corps of Engineers, Los Angeles, CA

The Politics of Beach Erosion in San Diego: A Regional Approach, Lou Terrell, San Diego Associations of Governments/City of Del Mar Councilman, Del Mar, CA

Beach Monitoring with Science Teachers, Neil J. Maloney and Gaylen R. Carlson, California State University, Fullerton, CA

Coastal Faulting and Erosion Hazards in Humboldt County, Northern California, Dr. Derek J. Rust, Humboldt State University, Arcata, CA

MANAGEMENT TOOLS: RESEARCH, CONFLICT RESOLUTION, NEW APPROACHES

Research and Education: Neglected Resources in Planning, Joel W. Hedgpeth, Santa Rosa, CA

The Problem of Economic Values and Non-Market Resources in Marine Resource Management Decisions, Richard J. Tinney, Jr., Center for Environmental Education, Washington, DC

A Microcomputer Assisted Information System for Coastal Zone Decision Making, Dr. Peter K. Weyl, State University of New York, Stony Brook, NY

Offshore Visual Resource Management: The Need for a New Aesthetic, Dorothy Hallock, Chandler, AZ, and James T. Chappell, San Francisco, CA

Technical Data Review and Management for Resolution of Marine Resources Conflicts, Dr. Ruthann Corwin, OCS Consultant for Marin County, San Rafael, CA and Dr. Michael J. Herz, The Oceanic Society, San Francisco, CA

Management of Marine Conflicts: The Role of Third Parties, Dr. Biliana Cicin-Sain and Phyllis Grifman, University of California, Santa Barbara, CA

Managing Conflict About Uses of Coastal Waters, Geoffrey H. Ball, Forum on Community and Environment, Palo Alto, CA, and Charlotte Symons, Education Consortium for Productive Conflict, San Francisco, CA

Independent Environmental Analysis in the Ocean: A Case Study, Dr. William W. Murdoch, University of California, Santa Barbara, CA

STATE/LOCAL GOVERNMENT'S MANAGEMENT ROLE

A Strategy for the Comprehensive Management of California's Marine Resources, Dr. James W. Rote, Assembly Office of Research, Sacramento, CA

Unified Management for California's Marine Biotic Resources, Dr. Elmer A. Keen, San Diego State University, San Diego, CA

State-Local Conflicts and the Management of California's Coastal Waters, Dr. Lowdon Wingo and Jim Fawcett, University of Southern California, Los Angeles, CA

Can a California Coastal Agency Provide Essential Internal Systems of Checks and Balances?, Carol Fulton, Friends of the Sea Otter, Carmel, CA

The Future Role of the State in the Conservation and Management of Offshore Wildlife Resources, Lindell L. Marsh, Robert D. Thornton and Susan K. Hori, Nossaman, Krueger and Knox, Costa Mesa, CA

What California Can Learn from Other Coastal States in Marine Resource Management, Vickie Allin, Office of Coastal Zone Management, NOAA, Washington, DC

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